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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF LONDON.

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VOL. II.

SESSION 1857-8.

Nos. I. to VI.

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EDITED BY DR. NORTON SHAW.

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NORTON SHAW.

ROYAL GEOGRAPHICAL SOCIETY,
15, WHITEHALL PLACE.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1857–8.

First Meeting, Monday, November 9th, 1857.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATION.—*Lieutenant-Colonel J. Temple West was officially admitted upon his election.*

ELECTIONS.—*Lieut. P. Blakiston*, R.N.; *Lieut. B. Brine*, R.E.; *Colonel H. Cartwright, Grenadier Guards; Lieut. A. H. Gilmore*, R.N.; *J. R. Elsey*, M.R.C.S., *late Surgeon of the North Australian Expedition; Frederick S. and William H. Homfray, and Edwin Williams, Esqrs., were elected Fellows.*

ACCESSIONS.—The accessions to the Library and Map-Rooms, since the last meeting, were numerous and important, among which were Davis's China; Jervis's Geological Map of the Crimea; maps published by the Topographical and Statistical Depôt of the War Department; Observations, Magnetical and Meteorological, made at the Observatory at Toronto; Maps of Bavaria, by the Bavarian Government; Plans of Delhi, by the East India Company and Colonel James, R.E., F.R.G.S.; French Charts, published by the Dépôt de la Marine; the Admiralty Charts and Sailing Directions; Map of the North-West part of Canada; Portrait of Rear-Admiral Sir T. Beaufort; Astronomical Observations made at the Radcliffe Observatory; the Transactions of the Hakluyt Society; Franklin Institute of Pennsylvania; the Academies of Sciences of Paris, Vienna, Madrid, and Stockholm; the German Oriental Society; Darmstadt Geographical Society; Geological Society of Dublin; Society of Antiquaries; the Royal, the Agricultural, the Astronomical, the Statistical, and the Geological Societies; the Asiatic Societies of London, Paris, and Bengal; the Madras Literary Society, &c.; the Minutes of the Board of Education; Coello's Maps of Spain, &c. &c.

The PRESIDENT said: Before we proceed to the regular business of the evening, I beg to congratulate you, gentlemen, on assembling at last in a place capable of receiving our members, who are now much too numerous to be

accommodated in our own meeting-room. The Senate of the University of London and the Royal Society have had the courtesy to permit us to meet here for the present Session, and I am glad to see that you are so conveniently seated. We have, therefore, to return our grateful thanks to those two bodies for having allowed the Royal Geographical Society to assemble in this fine building, now devoted to the advancement of science and letters.

But, while we assemble here, I would beg to remind you that the real business of the Society is carried on at our premises in Whitehall-Place, and, I hope, in a very effective manner. We have established there a Map-Office, which is found to be really useful to the nation. It is especially useful, I know, to Her Majesty's Government and to all the public offices. We have there a collection of maps of every portion of the world—maps difficult to be found elsewhere, and certainly such a collection as cannot be matched in any public institution in this metropolis; and during the recess we have re-arranged our Library, so as to render it really useful. I need not tell you that we are in a very flourishing condition, after reading out the long list of names of new candidates; and I am proud to be the President of a Society that has been successful beyond all that its warmest friends could have anticipated.

Various papers of great interest have come in during the recess, upon Africa, Australia, and other distant regions, of which I will not now attempt to speak, but I feel certain that they will sustain the credit of the Society.

There is one painful subject, and only one, to which I must allude, with reference to our African explorations. I am sorry to say that the slight hopes I entertained of the life of poor Vogel, the adventurous young astronomer, who was making his observations with such fidelity in the interior of Africa, have been almost dispelled. With regard to Corporal Maguire, of the Royal Engineers, the news we have received through the Foreign Office is unfortunately but too authentic, and we learn that the poor fellow has fallen a victim to assassins. We have, however, the satisfaction of knowing that he died like a true British soldier, and that before he fell, he slew two out of the numerous assassins who beset him.

Respecting the different explorations now in progress, you will perhaps expect me, at the opening of the session, to make some allusion to the expedition in search of the lost Franklin Expedition. I closed my Anniversary Address with some observations upon that subject, which has long touched my heart so deeply. I have, as you know, for years entertained the hope that some more vestiges might be discovered of the relics of my illustrious friend. I am, therefore, rejoiced to announce that the expedition which was got up with so much alacrity, so much zeal, and so much devotion by Lady Franklin, is prospering to an extent which her best friends could wish. The accounts from Captain M'Clintock are exceedingly satisfactory, as conveyed in letters to Captain Collinson and Lady Franklin, in addition to the letter to Mr. Barrow, which has been published in the *Times* and other papers. I will not now read the letters in my hand, as they contain little beyond the chief features that have already appeared in print. It is well, however, to dwell upon the fact that our distinguished friend Captain M'Clintock has been furnished with all the provisions, sufficient coal, as well as with the requisite number of Esquimaux and dogs, that he sought for upon the coast, and that he has started with good hopes and bright prospects, and with perfect confidence on his part that he will discover some relics of the ill-fated expedition. It is cheering to dwell upon this feature of the expedition, and to remind you that the gallant commander is accompanied by that noble-spirited Captain Young, of the merchant-service, who, having contributed 500*l.* and his own services, writes, in a letter to Captain Collinson, "I will receive no pay if it is to come from Lady Franklin's resources; I will only receive it if Her Majesty's Government recognise our expedition."

Lastly, I come to the great geographical publication of the year. I hold in my hand the book which recounts the journeys and researches of my eminent friend Dr. Livingstone in Africa. This production marks an epoch in geographical science. Whether we look to the candour and honesty of the man, to his clear-sightedness as a traveller, to the firmness of purpose with which he executed those high resolves upon which he was bent, we cannot but be proud, as Englishmen, that he should have been carried through such difficulties as he encountered, and have produced such a work as this. Though the modest traveller has stated in his preface that he would rather travel over Africa again than write a book, his story is here put forth in so artless, so clear, and yet so telling a manner, that I venture to say Dr. Livingstone's style will be admired by many of those who might be supposed to become his critics. It is really refreshing to turn to these pages, and see how a traveller, who is bent only upon speaking the plain truth to Englishmen, wins your hearts, and how he so carries you with him as to give you a full conception of the African character. In congratulating you and all my countrymen upon the production of this remarkable work, let me congratulate Mr. Murray in particular in having had the good fortune to meet with such an author as Dr. Livingstone.

The PRESIDENT then took the Diploma of Corresponding Member, which he had signed, and, addressing Dr. Livingstone, said: In the presence of this company of your associates, I beg to present to you this Diploma of the Royal Geographical Society. I hope you will accept it as a testimony of our unfeigned and sincere admiration of your conduct, and of the respect which, as geographers, we shall ever entertain towards you for having realised that which no Englishman has ever accomplished—the traverse of the great continent of South Africa.

The Diploma was then presented to Dr. Livingstone, amid the acclamations of the members.

Dr. LIVINGSTONE: Really, Sir, I am in want of words to express my gratitude and thankfulness for the very kind manner in which you have referred to my labours. I beg to return my heartfelt thanks to you, as the President of the Society, for the remarks you have made, and to the Fellows for the kind manner in which they have received those remarks.

The Papers read were:—

1. *Additional Notes on the North Australian Expedition under Mr. A. C. Gregory.* By MR. THOMAS BAINES, F.R.G.S., Artist to the Expedition.

In the beginning of March 1855, through the recommendation of the Council of this Society, I was appointed Artist and Storekeeper to the North Australian Expedition, and joined Mr. Gregory, the commander, in Sydney on the 21st of May. As his reports have been read at previous meetings, it will only be necessary for me to notice briefly the leading points in the operations of the expedition up to the time that Mr. Gregory sent me with a detachment of the expedition in the Tom Tough schooner to procure fresh supplies from Timor.

The expedition consisted of a total of 18 persons and 50 horses, and on the 12th of August we sailed from Moreton Bay, taking the inner passage to Torres Strait. During this part of our voyage we

had fair breezes from the south and south-east, with smooth water; and though the necessity of anchoring at night, during the latter part of it, somewhat delayed us, we were inclined to think that the dangers of the outer passage would have more than counterbalanced this disadvantage. We saw four or five canoes at different times in the vicinity of Cape York: they were of single logs, hollowed out, and fitted with outriggers, also of wood and boat-shaped, to prevent their capsizing.

The natives seemed to unite the characteristics of the Australian and Papuan races. They were ornamented with regularly formed scars, which, being pulled open as they healed, allowed the new flesh to rise and form a prominence as thick as a man's finger. They had spears of hard wood, with pieces of bone, forming points and barbs, lashed on with strips of bark, and bows of bamboo with strings of the outer rind of the same, and arrows of wood or reed tipped with hard wood. These, as well as pieces of tortoise shell, they bartered for sticks of tobacco, handkerchiefs, &c.

The country here was covered with ant hills of red clay, twenty feet in height. We searched on Albany Island for the graves of those who perished on Kennedy's Expedition, but I believe none of our party saw them. I painted a record of our visit in black letters on a rock near the beach.

On the evening of September 2nd, the Monarch, which was leading at the time, ran upon a reef; and the schooner, which anchored near, grounded for two hours at low water. We found the barque on a flat bed of rock, the inequalities of which we picked away, to lessen the chance of injury to her keel, but were not able to get her off till Monday, the 10th. We obtained a little water from the well mentioned by Captain Stokes on Quail Island.

On Friday the 14th of September we anchored near Point Pearce, having seen nothing of the Monarch for the last three days; and on the 15th we ran up with the flood tide between the broad shoals in the estuary of the Victoria. At night we entered the river, and anchored in Blunder Bay, where, on Sunday the 16th, Mr. Gregory landed with a party to search for water, and found a rocky pool containing several hundred gallons. We sailed immediately, and, on Monday afternoon, again anchored near Point Pearce, where we found the Monarch landing the horses, which, for want of fresh water, could no longer be kept on board. We of course assisted; and though we had to swim them three miles, forty-one were safely landed, seven or eight having been drowned, one irrecoverably fixed in the mud, and another lost after he was brought ashore.

The sheep were transferred to the Tom Tough, and the Monarch being no longer required, sailed for Singapore. Mr. Gregory, with the party from the Monarch, proceeded over land with the horses, while we in the Tom Tough were to meet him at Kangaroo Point, up the Victoria.

Unfortunately, in running up with a light wind and strong tide, the schooner grounded, and drifting with successive tides from one shoal to another, remained on shore for twenty-seven days, losing an anchor and cable, straining herself so that sometimes it was feared she would go to pieces, and spoiling a great quantity of bread from the water, which at one time was four feet deep in her hold. The sheep, a hundred and forty in number, suffered greatly for want of water, and died daily. We made a trip to Palm Island, thirty or forty miles higher up the river, and brought down six hundred gallons in the inflatable canoe, and commenced boating the sheep up to a place in Long Reach, where we had found a well, and where Mr. J. R. Elsey with three men formed a camp.

Here, in October, Mr. Gregory arrived with thirty-six horses, four having been left behind from weakness or died from poison, and three more had been dangerously bitten by alligators near a small creek of the Fitz Maurice River. He went down with me in the boat to the schooner, and, landing a little lower down the river, found water oozing from under a stone below high water mark. We scooped out a well, and in the night filled two large casks, much to the astonishment of the crew, who could not understand our digging for fresh water underneath the salt. Our sheep were landed at a small pool, and when the schooner reached the place where the camp had been established, were brought up by the boats; the poor remnant of our flock comprising only a few miserable skeletons out of two hundred. I repaired the inflatable canoe, making two boats of it instead of a double one, as originally intended; and, on the 15th of November, Mr. Gregory, with Mr. Wilson, myself, and Flood, started for a day's trip up the river, which we found, like most of the Australian rivers, a chain of pools, perhaps a mile or two in length, with long portages between them. In the afternoon of the 17th we turned back, reaching camp the next day.

On the 23rd, Mr. Gregory, with his brother Henry, Mr. Wilson, and Dr. Mueller, left camp with seven horses, to make a preparatory exploration of the country. Captain Gourlay was busy with his own and our men in cutting timber, with which he laid a substantial inner frame in the Tom Tough, and I was left to see to the safety of the camp and horses. Two of these strayed to a consi-

derable distance, and taking with me Bowman, the best of our stock men, I went out for three days without success; but, on the next attempt, thinking they might probably have gone to the westward, where Captain Stokes had indicated the mouth of a creek entering the Victoria, I had the good fortune to find a large stream, where we were met by a tribe of natives, six of whom stood out in skirmishing order, with their spears poised upon their throwing-sticks; others stood in the rear as supports, and the rest remained in the bush close by. Our efforts to conciliate them were fruitless, and as in another minute they would have launched their spears, we charged them at full speed, revolver in hand. They fled immediately, and after chasing them a few hundred yards, we let them go, not thinking it necessary to fire on them. In the afternoon we found the horses, and next day reached camp, where we met Mr. Gregory, who had returned. Mr. Gregory now selected his brother, Dr. Mueller, Mr. Flood, myself, and four of the men, to accompany him on his next journey. We packed 30 horses, 27 of which carried on each side 50 lbs. of flour, sugar, or pork, with other things, making up the load to an average weight of 168 or 170 lbs., and left six for the alternate use of the party. The gunpowder was securely packed in half pound canisters in the centre of the flour bags. On the 1st of January, 1856, we started, but the horses being fresh and wild, took fright and rushed through a swamp, throwing off their packs, and losing about 100 lbs. of sugar. On the 3rd all damages were repaired, and we started again. The rivers were at this time so much swollen by the rains, that we had to pass a line over a tree in Jasper Creek and swing the whole of our packages, weighing upwards of a ton and a half, across it.

On the 13th we reached the large western branch of the Victoria, and travelling up this till the 22nd, we turned to the southward, and next day, with a small party, pushed forward to select a convenient spot for a depôt. We found the land elevated to a height of 1160 feet, and consisting of extensive plains thinly overflowed with volcanic rock, which, forming good black soil, was covered with rich grass. Agate was plentiful, and out of this and the trap rock the blacks had been making vast numbers of spears and tomahawks, by striking one stone against another, something after the process adopted in making gun-flints. The ant hills had been excavated in search of larvæ and eggs; fresh water muscles had been fished up from the brooks; the trees had been notched by climbers in search of lizards, birds' nests, or honey; and holes in the ground appeared to have served as cooking places

for kangaroo or emeu flesh, which, wrapped in sheets of bark, was heated by several applications of hot stones.

On the 30th, Mr. Gregory, with his brother, Dr. Mueller and Dean, with eleven horses, started for the interior; and next day I selected a spot on Depôt Creek, in 17° S., to form a camp, building a bark hut for myself and the stores, and another for the men, and marking a tree line to the spot where I had parted with Mr. Gregory, to guide him on his return to my camp.

On the 15th of March, and forty-fifth day of Mr. Gregory's absence, the blacks commenced burning the grass round us, but were driven off; and we were subsequently much annoyed by their attempts to encircle our horses with a line of fire, thinking probably that they were wild animals, and that of course they had a right to hunt them. I was obliged to ride out every day for the protection of our stud, and one day, after having been nearly surprised by the natives during our halt at noon, got near enough to send a bullet past them as a warning, which fortunately was understood, and our cattle were not again molested.

On the 27th Mr. Gregory returned, having traced the source of the Victoria, and found a river, which he named Sturt Creek, flowing toward the south-west, as far as 20° 18′ S., where it terminated in a salt lake. From its appearance he supposed it would be flooded once in three or four years, when of course it would enable a party to penetrate much farther into the desert. Taking with him his brother, myself, and Fahey, Mr. Gregory now rode to the eastward, and traced nearly all the tributaries of the Victoria. The country was mostly basaltic or trap plain, and Mr. Gregory calculated that he had seen three million acres of first-rate, well-watered pasture. While fording the main stream of the Victoria, Mr. Gregory's horse trod upon the back of an alligator, which was lying just below the surface; but the monster, alarmed at the interruption to his slumbers, shot straight away into deep water, without attempting to injure either the horse or his rider.

In another branch we found a dam with a narrow opening, near which the natives place a large basket to receive the fish as they drive them through. There were also several paintings in red, white, black, and yellow, on the rocks, some of them representing a snake with two horns and two fore-legs. Beside these, we found a great number of rough stone-walls roofed with sticks and grass, so as to form a kind of hut; but they were too small even for a man to sleep in, and did not appear to have been put to any use whatever.

We saw very few kangaroos or emeus, but sometimes shot a lizard,

a crane, or a few ducks or cockatoos, all which were accounted good feeding by the party; while the snakes, which were just as good, fell to the share of Fahey and myself.

On the 9th of May we reached the main camp, which Mr. Wilson had entrenched during our absence. The schooner had been taken down the river and laid on a bank to complete her repairs, but nearly all her crew were more or less disabled by scurvy, and the carpenter had died. A good understanding had subsisted between the party in camp and the natives, except on one occasion when, I believe, spears had been thrown and a shot fired, which had wounded one of them in the arm.

Our rations had hitherto consisted of flour and salt pork, the latter having been so wasted by the sun that ten 4 lb. pieces, when weighed, amounted only to 8 lbs., but, nevertheless, had to be issued at their nominal and not their real value. Mr. Gregory now took a 6 lb. tin of preserved beef, and, kneading as much flour into it, made biscuits, which proved so satisfactory that he worked up a large supply for the next journey.

I was mostly employed in the boats conveying surplus stores to the schooner, which was about 35 miles down the river; and landing opposite on one occasion to meet a party of natives, one of them, after selling spears to one of our men, took them out of the boat again; they also attempted to steal a tomahawk, but did not succeed, and one tried to pass his hand behind me and catch the arm with which I held my pistol. Another snatched the gun carried by Adams, but the sailor, being a powerful man, wrested it from him, and would have shot one of them, had he been permitted.

On Saturday, the 21st of June, Mr. Gregory, accompanied by his brother; the surgeon, Mr. Elsey; the botanist, Dr. Mueller; and three men, with thirty-four horses, seven of which were reserved for the saddle, left camp for the Gulf of Carpentaria, having ordered me to take charge of the remaining detachment, and proceed with the schooner to Coepang, in the island of Timor, for provisions. After this I was to meet him in the Gulf of Carpentaria, at the fork of the Albert River, just above the highest point reached by the boats of H.M.S. Beagle.

In passing down the river I observed an alligator on the Horseshoe Flat, near Curiosity Peak; and going ashore with Mr. Humphery, the second overseer, we killed the animal, which was incapable of moving quickly on a level surface.

We took in water from Mr. Gregory's well, and wood from alongside, and the sailors gathered the fruit of the gouty-stem-tree,

the acid pulp of which, boiled up with sugar, greatly relieved the men, who were suffering from scurvy.

On Thursday, the 17th of July, we weighed and proceeded down the river, leaving a bottle with a letter, and a board with directions for finding it, on Entrance Island, as I had done already at the camp. On the 22nd we reached Point Pearce, and on the 25th we ran along the coast of Timor and worked into the bay of Coepang, where we anchored within half a mile of the beach opposite the town. The vessel had made but little water, and, as the sailors were still weak, I divided my own men into watches to work the pumps when necessary. The south coast of Timor seemed composed of mountains and rounded hills of moderate height, the latter covered with forest, and the lower slopes with cocoa-nut trees and other tropical vegetation. A small river runs from a gap in these toward the town; the water is fresh to within a hundred yards of the sea at low water, when there is hardly a foot of water on the bar, but vessels drawing six feet can enter with the tide. Fort Concordia stands at the mouth of the river, on a rock, apparently of old coral.

The Dutch resident, T. Van Capellen, was very kind to us; and though the master of the schooner had much difficulty in provisioning the vessel, I was in hopes that I could not only procure the supplies for the expedition, but assist him in those required for his crew, when the vessel was declared unfit to return east, and I had to run 600 miles to the westward to Surabaya, in Java—the strong south-east wind, which carried us thither, precluding all hope of our being able to work back again in less than six or eight weeks.

The Indian islands appeared very mountainous, and smoke was emitted from several volcanoes. Some of the hills in Java and Bali were 3000 or 4000 feet in height, but to the northward, as we passed through the narrowest part of the strait of Madura, towards Surabaya, the coast shelved down till it became an extensive flat, with broad mudbanks and shoals in the channel. The canoes and proas, under the immense triangular sails which their outriggers enable them to support, were very beautiful and picturesque, and I sketched several of them.

The town of Surabaya is situated on the Kedirie or Kaliemaas River, two miles from its mouth, opposite which the vessels lie, and passengers go up either in carriages or native boats, towed up by men walking on the bank.

The breaking of the Tom Tough's mainmast, while she was hove down for repairs, obliged me to discharge her, and having engaged a brigantine, the Messenger, on the 26th of August, every-

thing was transferred so quickly to her as to enable me to proceed to sea on the 30th.

To avoid the strong south-east wind and constant lee current on the south side of the islands, we kept to the north of them, where we found an eddy or counter current setting to the east with light variable winds, and by taking advantage of the land and sea breezes were able to make 20 or 30 miles a day.

With the purpose of keeping our water filled to the latest opportunity, and avoiding the consumption occasioned by a large quantity of live stock, I had given the captain leave to purchase provisions at Dielli, the chief of the Portuguese settlements on the north coast of Timor, where we arrived on the 1st of October, and about 3 P.M. anchored in a harbour almost perfectly enclosed by low coral reefs, the only other vessel there being a coasting schooner that had been 45 days in making the same passage as ourselves. We found the Portuguese Governor, Don Messada, very kind, and ready to dispense with any restriction that could cause delay. Here I purchased five horses with the intention of searching for traces of Mr. Gregory should he not have visited the rendezvous, and on the 4th October, at daybreak, we made sail. We worked our way slowly to the east, till we had nearly reached Timor Laut, when we shaped our course for Cape Wessel, but, the wind again proving contrary, only made Cape Croker on the 19th.

I had been occupied, with the help of Mr. Phibbs, in fitting saddlery to the horses for two riders and three packs, and making side-bags proportioned to the load they would be able to carry, and, as I expected light southerly winds in the Gulf of Carpentaria, in preparing the longboat to work in advance of the ship from Cape Wessel to the Albert River—thus, if it were possible, to communicate with Mr. Gregory, to inform him of the approach of the Messenger, and prevent his leaving with insufficient supplies. In this I was most cordially assisted by Captain Devine, who spent fully a week in doing everything that could be thought of to render the boat safe and comfortable.

Contrary winds and a strong current prevented our making much progress; and finding upon trial that the boat sailed faster in light winds than the ship, I determined to leave at once. I left instructions with the captain respecting the movements of the vessel; with Mr. Flood concerning the management of the party and horses; and with Mr. Graham, mate of the vessel, and Mr. Phibbs, overseer of the expedition, both of whom had volunteered for the service, I left the Messenger about 6 P.M. on the 23rd, New Year's Island bearing S.S.W. about six miles. We steered S.E. and E.S.E. all

night, going about two knots; but such was the strength of the current, that at daybreak we were barely able to weather the island. The breeze freshened during the day; and our boat, which was not more than 18 feet long, taking in much water, we were obliged to run for shelter, and reached a rocky islet to leeward of M'Clure Island about 10 P.M.

On the 25th, after an attempt to work to windward, we landed on the island, and spent the rest of the day in filling the open seams and stretching round the gunwales a couple of inflatable canvas tubes which the Captain had made for me. I found on the east or weather side of the island a plank of a Malay proa and several bamboo poles set upright in hollows of the rocks, most likely as signals of distress.

On the 26th we weighed at daylight and steered to the south-east with a fine breeze, falling away to calms, with squalls and heavy showers at night, against which we had no shelter, nor, from the room occupied by our water-cask and provisions, any convenient place to sleep.

On the 27th Mr. Phibbs was ill, and at night, finding that we could not stem the current, I anchored in three fathoms blue mud and shells, some miles from Sims Island. Next day I put into a small cove on the west side of Sims Island, and remained all day; Mr. Graham being attacked with a recurrence of fever and ague, from which he suffered periodically during the rest of the voyage.

On the 29th we worked through between the north and south Goulburn Islands; from the former of which three natives came off in a canoe of hollowed wood, and kept alongside, though we had a good breeze for single reefed sails. They managed their little craft with great skill, standing up in her with perfect ease, striking off the head of a rising sea with their paddles as a cricketer stops a ball, and baling out the water that entered with a large shell. One of them had a long pole, in which he inserted loosely an iron spike with a line attached to it, and stood up to spear a turtle, which, however, dived too soon. He spoke some words of English, as "Tobacco, me want him;" "Smoke him pipe;" "Berry good;" and, I thought, asked whether we were American. He told us there was water in the south island, and that his wife and piccaninnies were there. He gave a junk of turtle in exchange for some tobacco and a knife, and, when we tacked, ran along the shore with his "piccaninnies," waiting for us, in hope that we would land whenever the boat headed toward the shore. At night we landed on the north island to cook our supper, which illness prevented our enjoying.

On the 30th we stood to the south-east, with a heavy confused green sea, breaking occasionally in shallow places, and, as usual, at night had calms, with a squall, which pressed the boat's gunwale under before I could bring her to the wind, while a heavy shower drenched everything that the sea had not wetted.

In the morning we landed on a shelving beach, near Point Hall, and were joined by seven natives and a boy 13 or 14 years of age. Some of them had womeras or throwing sticks, rounded instead of flat, like those of the Victoria; but only one had a rough, sharpened pole, with which he speared a fish something like the snook of Table Bay. All except the boy were scarred, as usual. They could speak no English, but were very friendly, giving us as much of their fish as we chose to take, and sitting opposite our fire with their dogs to eat and drink the bread, pork, and tea that we gave them. They informed us that there was water to the north, where we saw the mouth of a small creek.

We had some difficulty during the day in finding a passage between a reef and the main land, and at night had strong breezes with indications of broken water. I am sorry to say that this day I found the chronometer and my watch wet through the leather case in which I kept them, and both were rendered unserviceable.

November 1st.—In the afternoon we made haul round the island, and, Mr. Graham being ill, I wished to land, but found the approach too dangerous; in attempting to work out the boat struck. We jumped out, and bore her off with no other injury than some severe cuts from the coral rocks that lamed us for several days after. I next tried another apparent harbour, but found no landing, and ran for Entrance Island, at the mouth of Liverpool River, where we found fire-places with heaps of charcoal and platforms for drying trepang, erected by the Malays.

On the 2nd it blew hard from the W.N.W. with a heavy and dangerous sea, and, after working all day, we weathered Sandy Island after sunset by little more than a quarter of a mile. The dangers of Cape Stewart and the Crocodile Islands were but imperfectly marked upon the map, and, failing to find any shelter, we were obliged to reef our sails and heave-to for the night.

In the morning of November 3rd we ran to the S.E., with a dangerous sea and breakers visible in almost every direction, to the largest Crocodile Island, where Mr. Phibbs swam ashore and discovered a small sheltered cove to which we followed him, and found the wreck of a Malay canoe and some trepang frames. The south side of the island not being marked on the map, I took sketches and bearings: it appeared to be a deep bay, fronted by other islands,

the rocks seemed hard and black like ironstone, and the rise of the tide was about 20 feet.

On the 4th we steered for Point Dale, and next day were becalmed off the opening marked as a probable strait, which, but for the loss of time, I should have been glad to explore.

On the 6th we landed at the mouth of a creek, but found it salt for a mile up and without water, except at tide time. In the afternoon we passed, as I believe, between the main and the land marked as Point Dale on Arrowsmith's map, with a tide of nearly four knots setting to the N.W., or dead against us, and sometimes completely neutralising the boat's progress. At sunset we reached the S.W. corner of the South Wessel Island, and, tracing up a small hollow, I found pools of water, containing several gallons each, and a native fire near them.

On the 7th we were working along shore with a light breeze and contrary tide, when I saw two canoes coming off from a rock near the North Cunningham Island. They landed on Wessel Island, and seemed to bring down spears, which shortly after we saw them take into the large canoe, while they put the boys into the other, shouting to us occasionally as if friendly. I ordered the fire arms to be prepared and kept out of sight, wishing to abstain from hostilities as long as possible, and answered them in a friendly manner. They now made a trial of speed with us, and finding that they could paddle faster than we sailed, took up a position on our weather bow, and came on slowly, holding up junks of turtle, as if for barter, till they were near enough for one of them to throw a spear at us. It fell short, and he ordered the rest to paddle nearer and give him another, but at our first shot he dropped it and fell with the rest into the bottom of the canoe. Finding, however, that her sides were not bullet-proof, they jumped overboard and towed her away. Thinking them sufficiently punished, I did not pursue them; but, to show the superiority of our weapons, fired a Minié ball over them as they landed at 600 or 700 yards' distance.

On the 9th we were nearly off the Truant Island, and sailing to the S. at the rate of 60 or 70 miles a day, passed Groote Island, and made the land to the S.E. of the Pellew Islands on the evening of the 12th.

From this time we had easterly winds, against which we could not make head during the day, working round by N. to W. at night, and by S. back to E. before morning. Being now constantly at sea, we fitted up a preserved beef-tin as a furnace with another for a boiler, and, by burning the husks of cocoa-nuts dipped in oil and

chips off the trail of our bow-gun, cooked our meals when the weather permitted.

We were entangled at daybreak of the 16th among the shoals near the Forsyth Islands, but after working all day cleared them, and passing Points Bayley and Parker, steered for Investigator Road, anchoring at daybreak on the 17th, about half a mile S. of Inspection Hill, on the S.E. extremity of Sweers Island.

After an hour's rest we looked into Investigator Road, and, finding no vessel there, steered for the Albert, off the mouth of which, shortly after noon, we saw the Messenger getting under weigh, and about 2 P.M. were cordially welcomed to her decks.

The Messenger had been obliged to call at Sweers Island for water, but that in the Beagle's well, which Lieut. Chimmo, the commander of the Torch, had considerately re-opened for our use, proved so salt as to be quite unpleasant even when boiled with rice. The few buckets of water in our cask were, therefore, fairly distributed, and I served cocoa-nuts to every one on board.

The Messenger had reached the mouth of the river on the 12th of November, or about five days before us, and Captain Devine went in with the gig to look for the marks I had agreed to leave, but of course found none. From the very gradual deepening of the water, he had not more than 11 feet at low tide nearly 8 miles from the shore, when Mr. Flood, being furnished with a boat, went up the Albert, which he found quite salt up to the farthest point reached by the Beagle's boats. He found letters which stated that Mr. Gregory, having reached the rendezvous in 60 camps from the Victoria, and having nearly four months' provisions still in hand, did not consider it prudent to wait the arrival of the schooner, and was to start on the 3rd of September for the settled districts.

The discrepancy between the account given by our party and that of Captain Stokes, of the Albert River may be easily accounted for when we remember that the boats of the Beagle visited it at the close of the rainy season, and ours after a long continuance of dry weather, and will not seem extraordinary when it is stated that we observed a difference of 15 or 20 miles in the lower limit of the fresh water of the Victoria in the wet and dry seasons.

One of the crew had died, and was buried at the anchorage.

On the 18th we anchored in Investigator Road, and, landing on Sweers Island, cleared out Flinders' well, which is in the bed of a dry gully, about 80 yards from its mouth; the upper soil being light black mould, and the lower stratum rocky. The water flowed as quickly as the men could bale it up.

On the 26th we had completed our water, and leaving a statement of our visit at the foot of Flinders' tree, on which the name of the Investigator is still legible, we commenced our homeward voyage on the 27th.

I was directed by Mr. Gregory's letters to call at Port Curtis and Moreton Bay, on the E. coast, and apprise the Government authorities there of his situation; but the time fixed for my departure having been so long past, I thought the probability of my being able to do him any service very small in comparison with the risk to which the vessel and party would be exposed, should we attempt the dangerous and intricate navigation of Torres Strait and the Inner Passage against the constant S.E wind and lee current always experienced there.

One of our largest water casks having been gnawed through by rats, 400 gallons of water were lost. This rendered it necessary to shoot the horses and throw them overboard. They could not have been landed at the Albert without great risk and an expenditure of at least two days for each horse, and on Sweers Island there was no surface water for them to drink. Besides this, as there were no mares, no good purpose could have been answered. I had a pair of goats which I intended to leave, but the female unfortunately died. I planted cocoa-nuts in a variety of places on Sweers Island.

We experienced light variable winds, mostly from the E., till the 19th of December, when we reached Coepang, and learned that the Torch had been there and passed on to Surabaya shortly after our first visit. The former resident, T. Van Capellen, had been succeeded by a gentleman from the Cape of Good Hope named Fraenkel, who treated us with great kindness during our stay.

On the 27th, our supply of water having been filled and the vessel well furnished with live stock and vegetables, we sailed from Coepang, but a strong gale from the N.W. obliged us to put back to Pulo Borong, a small island in the same bay, where the Government cruizer is laid for security during the N.W. monsoon.

On the 30th we again put to sea, but meeting with strong westerly gales did not weather the N.W. Cape till January 30th; and subsequently meeting strong S.E. and S. winds had to stretch very far to the W.

Our allowance of water had been reduced early in the voyage, a great quantity being consumed by the live stock, and on the 12th of February we were glad to meet an American whaler, the Mechanic of Newport, the captain of which kindly filled four casks for us, and finding a westerly wind in about 39° S., we were in hope of

completing our voyage, when a change drove us again to the N., and as we were again reduced to three pints of water per day each, I thought it prudent to put into King George Sound. Here we met the steam-ship Oneida, which had put back in consequence of some damage to her machinery, and learned with pleasure that Mr. Gregory and party had arrived safely at Sydney, some of the passengers having conversed with members of the expedition.

On the morning of the 6th of March we left King George Sound, and entered Port Jackson on the evening of the 30th.

T. B.

The PRESIDENT then directed attention to a series of paintings, from the pencil of Mr. Baines, illustrating the natural scenery of the regions visited by him.

The second Paper read was:—

2. *Report on the Country between Mount Serle and Lake Torrens, South Australia.* By Assistant-Surveyor G. W. GOYDER.

Communicated by the Right Hon. H. LABOUCHERE, M.P., F.R.G.S., H. M. Secretary for the Colonies.

To the Hon. the Surveyor-General.

Survey Office, July 8, 1857.

SIR—I have the honour to report that, after completing, on the 2nd of May last, the survey of the road from Saltia Creek to Pichi-richi, I proceeded to join the surveyors sent to triangulate the country beyond Mount Serle.

From the summit of Mount Serle, Mount MacKinlay is seen, about 12 miles distant, to the eastward; its rounded top and precipitous sides forming the most prominent feature in the landscape. The eastern plains are clearly perceptible beyond its southern fall, intercepted by that glittering belt of sand described by Mr. Eyre as the eastern wing of Lake Torrens, and which satisfied him of the impracticable nature of the country and the existence of an insuperable barrier to his efforts in that direction.

To the north-east and south-east of Mount Serle, Arcoona Bluff and Mount Rowe, which form the termini of the extended base, present their bold and rugged outlines to the eye; while more to the south the peaks of Constitution and Exertion Hills appear—their undulating spurs extending to the south, behind the southern portion of Mount Serle, which effectually shuts out the view in that direction. To the south-west the Anglopina Pound range is most conspicuous, backed by a variety of picturesque hills—named by the settlers the Cockscomb, MacFarlane Hill, Mounts Hack, Stuart,

Charlie, and Wallace—the latter situated in front of the Pound and at the head of the Mudla-pina Gap, through which the Frome collects its various sources and winds its sinuous way to the north-north-west, until lost amid the chaos of hills skirting the western plains. To the west and north-west the scene is of a more open character, the dry bed of Lake Torrens being dimly visible, and the plain horizon extending from Mount North-west to 12° east of north, where it is broken by Mount Rose, rendering it difficult to define the northern hills, among which the most peculiar only are clearly discernible. Mounts Deception, Scott, and North-west are easily distinguished, likewise a serrated range of considerable elevation beyond the bed of Lake Torrens.

The Mount Thomas Range, distant about 30 miles from Mount Serle, is visible to the north-north-east, over the low lands between Mount Rose and Arcoona Bluff.

Generally speaking, the scenery is too extensive to be easily described; and it is only by attending to particular portions that satisfactory views can be obtained. I saw sufficient to convince me, however, that no difficulty existed to prevent the successful prosecution of the survey; and as the base-line had been measured, and the triangulation fairly commenced by the 26th of May, it only remained for me to ascertain the nature of the country and probable extent of the survey beyond Mount Serle to complete the duty upon which I was engaged.

As I am not aware that the road between Pichi-richi and Mount Serle has been previously described, it may not be out of place to give a brief sketch of the country through which it passes, prior to mentioning that to the north of Mount Serle.

Proceeding northward from the Saltia through the pass, in the direction of Balcarrie—the head station of the Messrs. Ragless—the only objects of interest are the Devil's Peak and Dutchman's Stern, called by the blacks Ngowinyie and Yoorkakadnia. Ngowinyie is situated to the east of the pass, and is the most southern of a series of hills, differing materially in character from the general formation of Flinders Range, and to which I shall again refer when speaking of the ranges forming the various pounds. Its appearance is peculiarly striking and attractive; although the late storms have detached large portions of the peaks, from which it obtains the name given to it by the whites.

Yoorkakadnia is the name given by the blacks to that portion of Flinders Range immediately to the west of the pass—from the particular appearance of the rocks of which it is composed, *kadnia* being the native name for rock or stone. The Dutchman's Stern, how-

ever, is the northern portion of the range, which terminates abruptly in a supposed resemblance to the stern of a Dutch vessel.

About 6 miles north of the pass, a track branches to the left, over Pinkerton Creek, to Kanowie and the western plains; the road to Balcarrie continuing along the plain to Pichi-richi—a creek from which the pass takes its name—and thence to the Wiroughra Creek at Balcarrie, from whence a fine view of the surrounding country is obtained.

From Balcarrie the road bears 30° east of north, in the direction of Watts's Sugarloaf—a conical hill in the range west of Kanyaka—passing over a beautiful grassy flat for about 10 miles to the Woorianda Creek, near its junction with the Kanyaka, when the country becomes more hilly. The road continues for 5 miles farther, in the direction of the Sugarloaf, along the east bank of the Kanyaka, passing the head station of Messrs. Grant and Phillips, which is rapidly assuming the appearance of a village. It then crosses the creek and follows its west bank to its source, immediately beyond which the landscape is exceedingly fine—the Pound Range appearing to the north, with Rawnsley Bluff, Point Bonney, St. Mary's Peak, and Mount Boord in bold relief against the sky—having Chase and Elder Ranges to the right and left, springing from the long rich plains on either side of the Wornoka Creek; while, to the westward, the foreground is occupied by the Wornoka Hill and Venbulli, with its castellated rocks.

After passing the Wornoka, and crossing the plains north of that creek to the water-parting south-east of Elder Range, the country assumes a more broken appearance. The track, following a creek in a northerly direction to its junction with the Arquaba, continues along the banks of that creek to Point Bonney, passing Mr. Frank Marchant's station and Rawnsley Bluff; the former 30, and the latter 38 miles from Kanyaka. The scenery is hilly throughout, and of the most pleasing character; but the roads extremely rough and tortuous, and capable of but little improvement.

Rawnsley Bluff, Point Bonney, St. Mary Peak, and Mount Boord are the highest points of the range surrounding the Wilpina Pound, the only entrance to which is through the gap from which the waters of the Passmore find their way to the eastern plains. Of these pounds there are several in the northern districts, the Wilpina and Anglo-pina being the largest. The whole of the detached ranges, however, partake more or less of this character; and, from their appearance, justify the conclusion that they are of more recent formation than those of Flinders or the main eastern range. In the latter case, the surface is generally covered with fragments of clay-

slate weathered almost to powder, giving the hills a smooth and rounded appearance; the spurs on either side leading by easy slopes to the summit of the main range, showing that the upheaving force had acted uniformly for many miles in one direction; but, in the former, the summits are covered with huge masses of sandstone, which, from the watered appearance of the surface, seems to have been but recently removed from the bed of the ocean; while the perpendicular cliffs, forming into amphitheatres, with the strata inclining steeply inwards, induces the supposition that they have been formed at a time when the earth was submerged and violently convulsed by earthquakes, acting over an immense area, and from various centres, causing the stratified rocks to separate and sink under the superincumbent mass of water into the chasms beneath—while the outer portions were elevated to their present position—exposing the strata from the primary, to rocks of the most recent formation.

The road from Wilpina, the head station of Mr. George Marchant, follows the Passmore for about a mile to the eastward, down a valley of fine gums and groups of pines, and passing through a gap in the range, heads to the north over a broken picturesque country, to Hayward Hill, which must formerly have presented a serious obstacle to teams going north, though lately improved by a cutting made by the settlers. From Hayward Hill, the road descends by gentle undulations to a creek called the Yangana, and thence leaving Hayward Bluff to the westward, it passes over a mixed country; crossing the Eyatenah, Youngoona, and Okultenah Creeks to the Petaton, from whence to the Neuangaran the ground is more level; but from that creek to the Awanagan, the road passes over sharp spurs, emanating from an east and west range, south of Patawata, and crosses, by dangerous sidelings, Observation and Williagan Creeks, into the bed of the Awanagan, where it joins the road from the western plains by Patachilner Creek and Oratunga, the head station of Mr. John Chambers.

After passing through the Awanagan Gap, a few miles north of the junction of the two roads, they again diverge, that to the right passing northward by way of Awanagan Hill, the Patawata Plains, and Narina to the main gap, east of the Anglo-pina Pound, the only difficulty being a steep sideling on the Awanagan Hill which a slight expense would remove, rendering available a road replete with romantic scenery—as also is that to the left of Awanagan Hill, by Waraweena, the station of Messrs. Thomas and Walter Gill; but the latter road is positively dangerous, and ought only to be used for the passage of wheeled vehicles by persons who have previously

examined the track. From Waraweena the road passes northward under Mount Hack, and joins the Narina Road near the entrance to the main gap, through which it passes; and thence, over a rough broken country, crossing the Pinda Creek—and to the east of the police station at Anglo-pina to the Mudla-pina Gap at the head of the Frome, after passing through which, Mount Serle is in sight and all difficulties cease, there being a good road to Owiandina, the station of the MacFarlanes, about 4 miles north-east of Mount Serle.

Leaving Owiandina on the 27th May, I proceeded, accompanied by William Rowe and a settler who had volunteered his company and assistance, in a north-north-east direction to Umbaratana, the station of the Messrs. Thomas, which is at present the farthest out-station, and distant about 25 miles from Owiandina, and about 3 miles south of the Mount bearing their name. The road passes over the low lands already alluded to between Mount Rose and Arcoona Bluff, crossing the Arcoona, Gammon, Fifteen Mile, and Taylor Creeks. But little of the country is seen to the south of the latter creek—Gammon and Apex Hills presenting themselves on the right and left at the more elevated portions of the road; the former a fine hill north of Arcoona Bluff, and the highest portion of a range extending in a north-easterly direction to Benbonyatha—the latter is best seen from Fifteen-mile Creek, about 10 miles west of the road and easily recognized from its name.

Taylor Creek takes its rise under the west side of the Benbonyatha Range, running first to the north-west and afterwards in a north and north-easterly direction, and becoming a tributary to the George, which forms the west branch of supply to Blanchewater, joining the MacDonnell about 2 miles south of St. Mary Pool.

At Taylor Creek, the country becomes more open—forming into well-grassed plains, extending for several miles round Umbaratana, the name of a permanent water in one of the tributaries of the Taylor.

From the Messrs. Thomas we received every attention, and next day proceeded on our journey, crossing the plains to the north-east, and following a water-way until it became a broad deep creek, winding towards the northern plains, through steep and rocky passes, and introducing us to the Yerelina, which is of a similar character, but wider, deeper, the cliffs of greater elevation, and the bed more tortuous and difficult to travel. At sundown we camped opposite some blacks' wurleys—the only good feed for the horses being in their vicinity.

Shortly afterwards I heard the voices of blacks calling to each

other, as if in alarm—most probably exclamations at discovering the proximity of white people to their camp: they must, however, have withdrawn from the neighbourhood immediately, as we heard no more of them. Next day we continued in the same direction, for about 3 miles, to a high conical hill, to the east of the Yerelina, from which we had a splendid view of the country around, which, in point of romantic scenery, surpassed anything of the kind I had ever seen. The Yamba, Nepowie, and Benbonyatha Ranges were visible to the east, south-east, and south—their elevated peaks of sandstone, fashioned by the atmosphere into fantastic forms, rearing their pointed summits high into the air; the ranges interspersed by wide and deep creeks, collecting the water from innumerable gullies on both sides of the ranges, and trending their tortuous way to the north under perpendicular cliffs of enormous elevation, and intercepting the narrow valleys with their wide stony beds, rendering the way—though delightful at first, from the beauty and variety of the scenery—difficult and harassing in the extreme. At noon we camped on the MacDonnell, resuming our journey in the afternoon, but abandoning the rocky bed of the creek, and working our way north over the ranges by bearing—continuing in the same course until noon of the next day, when we cleared the hills, and camped at a deep and permanent water in the bed of the MacDonnell, which we had crossed and re-crossed several times in our northerly course.

In the afternoon we resumed our journey down the dry bed of the creek, which gradually increased in width, with high cliffs on either side, one of which we took to be Trimmer Bluff. About two miles farther down the creek the cliffs contract, and the bed becomes rocky, and difficult to traverse—the men accompanying me passing to the eastward to avoid the rocks, while I ascended a high bluff, to examine the course of the creek beyond, and was well repaid for my trouble, by discovering that a channel, from 60 to 70 feet deep, had been cut out of the solid rock by the action of the water in times of flood, varying in width from 80 to 100 yards, and nearly a mile long, in which lay a magnificent sheet of water, running strongly at the south end, and increasing in depth towards the east bank. The margin on either side was fringed with fine gums, extending down the creek, considerably beyond the spot where the waters were again absorbed into the earth.

This scene, so sudden and unexpected, forming so great a contrast to the arid plains and sandy-looking soil composing the bed of the creek over which we had so lately passed—the placid appearance of the waters, disturbed only by the quiet enjoyment of the water-fowl,

swimming about on its surface—the rich luxuriant foliage and stately gums—afforded a feeling—a pleasure that can only be realized by persons similarly situated to ourselves.

This water, which we named the Freeling, is in latitude 29° 45′ south, and is well situated as a depôt for persons going north, and an easy day's journey from Blanchewater. After making a few sketches, we continued northward for about 12 miles, and camped on a gum-flat, under the west cliff of the valley of the MacDonnell, covered with quantities of succulent herbs and grass, but with no surface water.

On the following morning, while ascending the cliff north-west of our camp, and which we named Camp Hill, we were delighted to observe cockatoos flying over our heads from the north, which augured well for Blanchewater, which we had not yet seen.

From Camp Hill we took observations to Mounts Hopeless and Hopeful, the former bearing 17°, and the latter 31° 30′ south of east, and apparently about 25 miles off. We also took bearings to a conspicuous hill on the north-east, about 4½ miles distant, which we named View Hill, supposing that a good idea of the surrounding country could be obtained from its summit.

On looking round from the elevation upon which we stood, it became evident that the cliffs on either bank of the creek were formerly mere undulations, rising from the general level of the plain, and that the bed in which the creek lay had been gradually washed out by the action of the water to a valley, varying in width from 1 to 4 miles.

The scene from View Hill proved to be as satisfactory as we anticipated, and was uninterrupted for a radius of at least 20 miles. There was no appearance whatever of Lake Torrens, but five large creeks could be seen to the eastward—converging into two—as they inclined to the north-east, and ultimately becoming lost to view in the distance.

Descending View Hill, we proceeded due east, crossing the source of the first creek, and making the second at 3½ miles from the hill; there were large gums growing in the bed, and pigeons flying about, but no surface water. At 7 miles we crossed the third creek with water in its sandy bed, but as this appeared salt, and the banks to be encrusted with the same substance, we were about to turn away; but the horses drinking with avidity induced us to taste the waters, which, to our surprise, we found to be perfectly fresh—and what we supposed to be common salt, a salt of ammonia brought down in solution in times of flood, and deposited upon the banks as the waters subsided, and the moisture became evaporated from the soil in the bed of the creek.

It may appear anomalous that so volatile a substance as ammonia should remain for any time in a salt exposed to the rays of the sun in sufficient quantity to be perceived. That such is the fact may be relied upon, though whether retained by the presence of any other base or not I am unable to say.

Its existence was afterwards detected by Mr. Painter, from a small sample carried in my pocket for upwards of a week, without his being informed that the salt was supposed to contain ammonia; under any circumstances, it is gratifying to know that the waters are fresh—and as I used them for two or three days without feeling the slightest inconvenience, it is reasonable to suppose that there is nothing deleterious contained in them.

A little farther to the eastward we came upon a tributary to the last creek, at a place where a quartz rock cropped out of the earth, a little to the south of which was a pool of permanent water; this rock appeared stratified, and inclined at an angle not exceeding 20° to the south-west. We continued on this bearing for 20 miles from View Hill, until Mount Hopeless bore south by west, crossing about 2 miles to the east of the fifth creek, which we named Jacob's Creek, as it appeared to emanate from the northern run claimed by that gentleman. We afterwards proceeded northward for about 2 miles, and camped in the fork at the junction of the two creeks; the land well grassed and improving in appearance towards the north-east, and the tracks of cattle numerous and recent.

On the 1st of June we traversed about 30 miles of country, extending our observation north to lat. 29° 20′, where the ground became soft and free from stones, the timber in the beds of the creeks assumed a more stunted appearance, and the creeks trended more to the eastward. After zigzaging the country to the south and west, we reached Blanchewater late in the afternoon; and, paying a short visit to St. Mary Pool, camped on the creek for the night.

St. Mary Pool is situated in lat. 29° 30′ south, and about half a mile north of Blanchewater; it is 100 yards wide by 120 long, the edges covered with reeds, and the whole surrounded by gums. The water is on a different level to that of the Blanche, which is a canal-like stream, about a mile long, and from 30 to 40 yards wide, the waters turbid and the banks lined with reeds and gum trees; while the waters of St. Mary Pool, percolating though the intervening rocks, are perfectly clear. There were quantities of teal, ducks, geese, cranes, cockatoos, pigeons, shell-parrots, magpies, curlews, crows, hawks, and other birds, flying about, and numerous tracks of cattle, but none recent.

On the morning of the 2nd we proceeded to a hill about a mile

north-west of Blanchewater, from which we obtained a tolerable view of the country in the immediate vicinity; from whence we directed our attention to a lagoon of fresh water 2 miles farther north, emanating from a number of delicious springs, which extend over a considerable area, the water running in little streams from fissures in the rocks, which protrude for several feet above the plain. Still farther to the north these springs increase in size, and are surrounded by masses of reeds, near which stand the remains of a native encampment. The ground for a considerable distance around is covered with the salt of ammonia, having a similar appearance to snow after a partial thaw, but so nearly resembling the common salt as to make it difficult to divest oneself of the idea that the springs are not really brine.

About half a mile north of the Reedy and Rocky Springs, we ascended a hill, which, although of no great height, was peculiarly conspicuous, and which, from its appearance, we named Weathered Hill; the lower portion being of slate surmounted by a coronet of sandstone—the whole surrounded by sand, separated by the action of the atmosphere from its once elevated summit.

In the extreme distance, to the north and north-east, we perceived a belt of gigantic gums, beyond which appeared a sheet of water with lands on the opposite side evidently increasing in elevation. There also seemed to be a large lake about 10 miles to the east; but this our previous experience told us had no existence. To the north-east, the MacDonnell continued its course, diverging into a number of channels as the rocks neared the surface, and again converging into one as the depth of soil increased. To the south-east, the extreme end of the eastern range was still visible, Mount Hopeful bearing south 32° east, and apparently about 30 miles distant.

From Weathered Hill, we descended in a north-easterly direction to the MacDonnell, following its course down for about 7 miles, passing several large and permanent waters, the last of which, about half a mile long, 50 yards wide, and very deep, was extremely fine, having a native encampment on the eastern bank, at its lower end. The wurleys did not appear to have been used since the rain, however, the floors being caked over and cracked by the heat of the sun. They are constructed in a similar manner to those described by Captain Sturt, and are warm and comfortable, the largest capable of holding from thirty to forty persons, being quite round, from 3 to 4 feet high, and entered by a semicircular opening, through which we were obliged to creep. This water we named the Werta-warta, from the name of the tribe frequenting the plains north of the Blanche.

Next day we continued our course to the north-east, down the bed

of the creek, for about 14 miles, passing over vegetation of the most luxuriant kind, which covers the valley for a width of from 3 to 4 miles; the timber in the creeks changing from lofty gums to a bastard peppermint, which was rapidly assuming a more stunted appearance, and the creeks bending away to the eastward. We then left the MacDonnell, and made for the nearest point of what was rapidly assuming the appearance of an immense lake; and after travelling about 6½ miles to the north-east, our doubts were set at rest—we were in latitude 29° 13′, and stood upon the margin of Lake Torrens, the waters of which were unmistakeably fresh.

From the spot where my observations were taken, the lake stretched from 15 to 20 miles to the north-west, forming a water horizon extending from north-west-by-west to north-west, the south portion terminated by high land running south towards Weathered Hill, at once explaining the cause of the various creeks bending so much to the eastward. An extensive bay is formed inside this promontory, extending southward to west-north-west, when the land again runs out to a point, approaching and passing us by a gentle curve to the east, and inclining gradually to the south-east, and ultimately disappearing in the distance. The north portion of the horizon is terminated by a bluff headland, round which the water appears to extend to the north. This land passes thence to the east, and forms the north boundary of the visible portion of the lake; and, from a higher elevation than that upon which we stood, appeared to extend round to the eastern wing. It is covered with vegetation, as also are several islands seen between the north and south shores, apparently about 5 miles distant from where we stood; their perpendicular cliffs being clearly discerned by aid of the telescope.

From the first, I had anticipated finding large lakes of fresh water at the termination of the various creeks, or one large lake into which a number of them discharged their waters; but in such I should have discovered flood lines, indicating the rise and fall of the waters; and, even supposing them to have attained their maximum height, the vegetation on some portion of the surface inside the water's edge would have revealed this fact. But, in this case, there was an entire absence of such marks, the water's edge being clearly defined; and the bed changing its character so suddenly from an alluvial soil to blue loam, covered by an inch of fine silt, renders it almost beyond the possibility of a doubt, that the surface of the water is subject only to the most trifling variation of level; and the absence of deltas at the embouchures of the creeks tends to show that there is no reacting force, but that the waters, in times of

flood, flow uninterruptedly elsewhere: and I am inclined to believe, in a generally north-west direction.

In using the words unmistakeably fresh with reference to this water, I meant to imply that not only did it appear fresh to the taste, but that also there was no indication whatever of the presence of salt; and I only regretted the absence of the means which would have enabled me to test not only its extent and direction, but also its depths and action.

We afterwards proceeded due west for 20 miles, to obtain a view from the summit of the high land running from the north-west to Weathered Hill—crossing, on our way, two creeks at 10 and 13 miles distance. The first we named Duck Pond Creek, from the existence of two large waters in its bed, one of which was half a mile long, was wide, deep, and fringed with trees similar to the Blanche, with quantities of ducks swimming about. The second we called Mirage Creek, from its forming the boundary of an imaginary lake, which we supposed we were approaching, but which disappeared as we neared the elevated land. It would be perfectly useless to repeat the number of times we were deceived by mirage, and surprised by the enormous refraction peculiar to these plains; some idea of it may be obtained from the fact that the large gums, seen from Weathered Hill to the north, proved to be bushes of from 2 to 4 feet high; and a large hill seen from the summit of Mount Serle, by aid of a powerful glass, and which we estimated at about 3000 feet, dwindled down to 60. In fact, horizontal angles are of little value, and the mere appearance of water no test of its existence; but this deception is only possible when away from water, the difference being so great when in its actual presence as to render deception next to impossible.

On reaching the top of the hills we found them to be composed of table lands and sand hummocks, succeeded by ranges of a better character, forming well grassed basins and valleys; a few of which contained lagoons of fresh water, gathered from the late rains, from which the waters were rapidly evaporating.

Having now ascertained all that was necessary to enable me to give instructions relative to the extent of the survey, we retraced our steps by way of St. Mary Pool and Mount Freeling (the highest of three hills on a range running north-west to the plains, the most northern of which we supposed to be Mr. Eyre's Mount Distance—and named accordingly, the intermediate hill having been previously named Mount Gardner), taking bearings from the various hills named on our route, so as to enable the surveyors to follow and complete the triangulation, which, with favourable

weather, will in all probability be extended to Weathered Hill this season.

On the 9th of June I left Mount Serle on my way to town, after communicating with Mr. Painter, and receiving the report of his progress in the work upon which he was engaged.

During the journey I visited the stations of many of the settlers, from whom I received much useful information, and to the kindness and experience of Mr. Thomas Gill, who supplied me with sketches and local names, I owe the ease with which I was enabled to recognize places previously visited by himself and Mr. Hack.

As Lake Torrens may probably become a depôt for future observations in the northern districts (a properly-constructed boat being placed upon its waters, enabling their nature and extent to be ascertained, and serving as a connecting link between the two shores), I may be permitted to suggest what appears to me to be a very easy method of improving the line of road to that locality, and of rendering a tract of at least 30,000 square miles of country available for pastoral purposes. It is, that the Government should initiate a series of wells by boring—following the principle used in the construction of Artesian wells, but avoiding the use of expensive cylinders, substituting in their stead inexpensive pipes, capable of being soldered together during the progress of the work, and so constructed at the head as to ensure their protection after the water had been obtained.

That this could be done at no great cost, there is little reason to doubt, it being well known that the large quantities of water flowing from the ranges to the plains are not lost by evaporation, but by absorption, and that it would again find its way to the surface, if not prevented by intervening strata of rock or clay; and as to penetrate through these strata is all that is required to obtain a supply of water on the surface of the ground, the expense would be but the tear and wear of the apparatus, the labour of the men required to work it, and the cost of pipes.

That the first well should be sunk at Port Augusta; and, after water had been obtained at that place, the apparatus should be placed at the disposal of the settlers upon the western plains, who would then have an opportunity of forming watering-places at pleasure, and the mountain road would cease to be used as a general line of traffic, and persons desirous of securing runs could obtain land, estimating the probable cost of a sufficient supply of water, by knowing the expense incurred in sinking the well at Port Augusta; and that port would be hastened towards that important position among the ports of the province, which, sooner or later, it

is destined to attain; doing away, at the same time, with an inconvenience and expense known only to those persons residing in or near the township, and supplying a desideratum to the inhabitants, the value of which it is impossible to overrate.

During the journey I made numerous observations on the direction of the magnetic meridian, measuring with the utmost care the general and diurnal variations of the compass, at different altitudes on the same meridian, and in different longitudes on the same parallel; but, being desirous of connecting these with observations made in the vicinity of town, which have been delayed by the unfavourable state of the weather since my return, I withhold the result for the present.

I have the honour to be, Sir,

Your most obedient servant,

G. W. GOYDER,

Assistant Surveyor-General.

COLONEL GAWLER.—It appears to me Lake Torrens is now the most important feature of Australian geography, and the great key to the still unknown interior. I look upon this remarkable discovery, so far to the northward and eastward, as calculated to stimulate our President, and all who are interested in this important subject, to push on with systematic and vigorous exertions.

It is almost incredible that so close to Eyre's barren route there should be a beautiful country, with fresh water, when he had given up all hopes of discovering it. This, I think, should lead us to form more favourable anticipations with reference to the character of the interior. In Australia, oasis and desert do alternate in such an extraordinary manner, that although Sturt found desert on the east, Eyre desert to the south, Gregory the same feature to the north, and Austin again to the west, yet we cannot at all say that the whole of that immense interior, of more than 800 miles in width by above 1400 miles in length, may not contain extensive, well watered, and fertile districts.

Eyre's expedition went out with a view to penetrate into the centre of Australia, as a step towards opening a communication between the south-eastern provinces and the north-western coast. The political and commercial advantages of such a line would, of course, be immense. It would at once connect Australia with India and with England, and open a route by which possibly a line of rail might be run, or, at least, stock might travel, to the rich islands of the Indian Archipelago, and the south-eastern provinces receive the produce of those islands and of China and of India in return. The south-eastern provinces have just what the Indians want,—horses, wool, copper, and stock; and Asia just what the south-eastern provinces want,—tea, sugar, coffee, rice, silks, and cotton.

I really trust that this good land is a genuine discovery. The fresh water lake to the north is a very singular feature. I have no idea that that, or any portion of that immense lake Torrens, has been formed or can be kept up under a sun of 30° from the equator by mere local rains. I believe that the greater portion of the water is produced by extensive river and lake systems which drain the great interior.

Picture to the mind the dimensions of that lake. To judge of it by looking at home, let us place ourselves on Highgate Hill, and, if possible, stretch the eye to Gravesend or Chatham—that is the breadth of it near its south-western

extremity. Carry on this base from London to Newcastle-on-Tyne, diminishing the breadth to twelve miles; then turn that long straight line into something like a horse-shoe shape, and you have the area of *what we know* of Lake Torrens. Such an immense mass of liquid matter cannot be the product of local rains. But we know nothing of the north-west, and nothing more of the north than that which Captain Sturt and Mr. Goyder have pointed out. Though from the hills near Mount Serle the shores of both sides of the lake to the east and west are seen, to the north-west there is an unbounded horizon. Where that goes to no one knows: perhaps to a great internal drainage.

Then there is another feature with which our present subject is connected —that "stony valley," which Sturt crossed, of about thirty miles in breadth, that appeared like the bed of a great watercourse. It could have been but recently under inundation, for there were immense tracts of mud without a blade of grass upon them. The inundation, too, must have been of fresh water, for fresh water pools were found in the vast valley. In such a climate, mud like that would in two or three years certainly produce herbage.

That watercourse, stretching N.N.E. and S.S.W., had been recently inundated, probably by the tropical rains filling an immense reservoir of which we know nothing, but with which Sturt seemed to connect some native traditions. This watercourse, the wastepipe of a more northerly supply, coming down to a point not far from the newly-discovered fresh-water lake, is possibly the means of keeping it up. What a remarkable feature that is! and how fraught with probabilities of more extraordinary country!

My strong persuasion is that, at no very remote period of time, Spencer Gulf was the mouth of a great river that drained the whole of the western interior of Australia. As the Murray drains the eastern interior, and forms Lake Alexandrina, near Encounter Bay, so a great drainage from the west may account for Lake Torrens. As you sail up Spencer Gulf, it has all the appearance of an estuary quite up to what is called Port Augusta. The comparatively narrow mouth near that locality becoming stopped up by the detritus brought down by the rivers, the water has extended itself into the basin that we now see filled, and, perhaps, a great deal farther, forming the immense evaporating pool of the waters of the interior. It is reported that at some seasons there is still a strong current from the lake into Spencer Gulf.

If South Australia were allowed to extend its boundaries three degrees to the west and north, it might perchance take in a tract of country which would send rich produce down to Spencer Gulf. The immense mineral riches of the south-east also might have some repetition. Already has there been a copper deposit discovered near Mount Serle, which is said to promise to rival the Burra-Burra.

It is true these are matters of speculation; but if, on one side, we speculate on a desert, we may, on the other side, with such striking appearances, speculate on good lands and a valuable country. Remember, in that country there are not only the tropical rains falling to the north, but there is the whole sweep of the vapours of the Southern Ocean coming with the prevailing winds from the south-west. I could mention strong atmospheric evidences from personal observation, in which Mr. Eyre, in his narrative, bears me out emphatically—that there is a cool and well watered country to the northward of the Port Lincoln peninsula. Therefore, as I have already intimated, I heartily hope that the discoveries, of which we have just heard, will stimulate the Geographical Society to exert its influence to push on these researches to the utternost.

I will only say one word more. We have seen great travellers stopped. Leichhardt we have lost; Sturt was stopped; Eyre was turned back to the coast; Gregory was stopped; Austin was stopped. We have tried to take the interior of Australia by assault. Now the late war has made us all tacti-

cians in a degree; it remains for us, therefore, before we give it up, to attempt to take it by sap.

If the interior be really a waterless desert, I would say that it is probably still perfectly traversable. Observation has led me to the strong conviction that the surface-waterless-tertiary deserts of Australia abound with sub-surface water. I should expect to find it at depths in general of not more than 120 feet. If it be so, a progressive system of wells, with depôts, might be carried, with certainty and safety to the party employed, across every intervening desert. Twenty-four wells, about fifty miles from each other, would establish a practicable route (the whole way, if the country be surface-desert) from the south-western extremity of Lake Torrens to Stokes and Gregory Victoria.

The deserts of Australia abound with wood-fuel, and if the water were sometimes salt, boilers and condensers, light enough for bullock drays, might avert the evil.

I have no doubt whatever but that, in the worst of circumstances, Australia may be safely and surely traversed by patient ingenuity; and I would say that the honour of England (if there were no other motive) requires that it should be done.

The PRESIDENT.—With reference to the observations which have fallen from Colonel Gawler, I can, at this late hour, only say that I have come to another conclusion concerning the condition of Central Australia. But, whilst my own views are printed in the last Anniversary Address, I shall willingly stand corrected if his theory, founded upon a personal acquaintance with the country, should prove correct, and that our colonists should be enabled to travel across the interior of that great continent, which is generally considered to be an impassable saline desert.

The third Paper read was :—

3. *Notes from the Mission to Central Africa.*

Communicated by the Earl of CLARENDON, F.R.G.S., H.M. Secretary for Foreign Affairs.

DR. VOGEL, who had arrived at Kuka after an absence of ten months and twelve days, wrote as follows on the 4th of December, 1855 :—

"I am not able to give now a detailed account of what I have seen and done, as arranging my papers, reducing my observations, and making a map, will take at least three weeks more time, but I will describe to you, as well as I can, the road I have taken.*

"On the 20th January I left Kuka for the town of Yacóba, accompanied by Corporal Macguire and four servants. On the road I had to pass through the capital of the large province of Gombé, situated on a large tributary of the Chadda, called

* For astronomical observations upon this route, *see* the first volume of 'The Proceedings of the Royal Geographical Society.' The observations of Dr. Vogel's route from Kuka, south to Tubori, have not reached this Society for calculation. —ED.

Gongola, which has its source in a mountainous district 40 miles south-west of Yacóba, and runs from the W.S.W. towards E.N.E., and therefore in the opposite direction, but parallel to the Chadda, and in the same direction with the Yeou, from which river it is separated by a low plateau, about 300 feet high and 40 miles broad. Fifteen miles W.S.W. of a small Bornu town called Gabbei, in about 11° 40′ North latitude, and 11° 20′ East longitude, the Gongola makes a sudden bend towards the South, and after a course of about 100 miles more empties itself into the Chadda. In Gombé I was received very kindly by the Sultan. Thence I reached in four days Yacóba, on ascending a large granite plateau of about 2500 feet elevation, densely populated by heathen tribes, most of them entirely naked, and wearing pieces of wood of from one to two inches in diameter in their perforated upper and under lips. Two hours after my arrival in Bautshi, I was informed by the governor that I had to leave the place immediately, as he suspected me to be a spy of the Bohari, a marauding Felatah tribe, residing in the neighbourhood of Katagum, and, I am sorry to say, aided and protected by the Sultan of Bornu; the Sultan of Bautshi having been already during seven years absent at a place three days N.N.W. from the capital, waging war with a neighbouring Kerdie tribe, the Sonoma. I had some trouble in getting permission from the governor of the town for Corporal Macguire and my servants to remain, in order to make the necessary preparations for my projected journey to Adamawa. I myself left on the second day for the camp of the Sultan Sanyanni Bautshi, accompanied by only one servant. The Sultan received me very kindly, and kept me at his place for forty days, during which time I nearly fell a victim to the climate. After having suffered from dysentery for thirty-five days, I thought that change of air would be the only means of saving my life, and the Sultan not giving permission for my departure, I was obliged to leave his place secretly, being so weak that my people were obliged to lash me to the saddle. Arrived in Yacóba, I found all preparations for a farther journey made, but at the same time, to my regret, Macguire so ill, that it became necessary to move immediately for a more healthy district. We both rallied in a few days after leaving Yacóba, which is dreaded on account of its excessive unhealthiness. This circumstance is the more surprising, as Yacóba is situated on a high dry plateau, thickly studded with granitic mountains of the most extraordinary shape. On the last of April we crossed the Chadda, exactly at the spot which the steamer Pleiad had reached; numerous empty pickle and brandy bottles giving sure evidence that Englishmen had been there. We

found the Sultan of Hamarua in a a small village, Tindang, a day south from the river, and to my regret, at war with the heathen tribe of Bashama, through whose country is the only road practicable for horses to Adamawa. The Sultan told me that Mohamet el Amwel from Yola had, in vain, attempted to open a communication with him, as a body of Bornu horsemen had joined the enemy. I must observe that all the numerous bands of robbers which infest Southern Sudan are openly protected and aided by the Sheik 'Amur' of Bornu, who takes a tribute from them, amounting to thirty slaves for every successful marauding expedition. After having waited nearly a month at Tindang for the opening of the road, I was reluctantly obliged to give up my attempted journey to Adamawa, but not until I was assured that this state of things would last at least six months longer; the Sultan of Yola having been beaten back with great loss; and not until a small Sokatu caravan which had tried to open the road was destroyed only half a day's distance from Tindang. On retracing my steps, I took a new route *direct* to Gombé through the countries of the cannibal tribes Yemyem and Tangale, very seldom even visited by the inhabitants of the surrounding country. The country is very mountainous, and the travelling exceedingly difficult. The Tangale inhabit a high chain of mountains on the banks of the Chadda, with a fine peak very much resembling Adam-peak in the island of Ceylon. In the middle of June I arrived at Gombé, having lost nearly all my luggage-animals; and after having sold part of the remainder of my merchandise, I proceeded on an expedition to Salia, being obliged to leave Macguire behind in Gombé with the rest of my property and to take care of the few remaining horses. During his stay of two months and a half, he experienced the greatest hospitality and kindness as well from the Sultan as from the inhabitants of the place. My journey to Salia, during the height of the rainy season, without tent and scarcely any luggage, was very difficult on account of the inundated state of the low country, and the lofty chains of mountains I had to cross. I regret that in crossing a small river I lost the numerous plants I had collected, also my thermometers, boiling water apparatus, and the better part of my merchandise. Two days from Bautshi I had to cross the Yeou at its source, and three days from Salia two little rivers flowing west, and emptying themselves into the Niger. I reached Salia towards the end of July, and was very well received by the governor, in the absence of the Sultan. This town is the largest in the interior of Africa, about 10 miles in circumference, with a ditch and an excellent wall about 15 feet high. The inhabitants do not

exceed 30,000, the great part of the space inside the wall being occupied by fields. The town bears three different names, Segseg, Salia, and Sansan; the *first* after the heathen tribe from which it was taken about the year 1807, by the Felatah of Rashna; the *second* is the new Felatah name; and the *third*, the name by which the town is known in Bautshi, and at the same time that of the whole province. The country between Bautshi and Salia is entirely inhabited by heathen tribes, mostly without any dress, ornamenting themselves with a bit of rice-straw in the upper lip. Their villages being on the top of the steepest rocks, the Sultan adopted the following plan of catching slaves: he occupied with an imposing force the fields in the valley, driving all his horses in the then green harvest, until the poor fellows on the mountains surrendered for fear of starvation, and sent down the number of boys requested of them. The Sultan thus obtained in three weeks 200 fine slaves, who were marched off immediately to Sokatu for sale.* Towards the beginning of August I proceeded from Salia to Bebetgi, one day's distance from Kano, which place I did not visit on account of the cholera being very bad there, and the Sultan having just died. From Bebetgi I returned to Bautshi by a different road through the country of independent heathen tribes, and then, following a very kind invitation from the Sultan, I proceeded once more to Tindang. After a stay of a few days there, I received an acknowledgment of the presents made by me on my first visit, *i. e.*, of 10,000 shells, or about 40 dollars, and a very fine dress; and furnished again with money, I planned a new expedition to the Chadda by a new route. Being no longer in want of the depôt in Gombé, and the remainder of my baggage-animals having recovered, I gave orders to Macguire to return to Kuka with all my servants but one.

"On the 21st of September I left Yacóba once more in a southerly direction, moving upon the town of Ukali. The road being entirely impracticable for baggage animals, I could only take as much luggage as my servant could carry on his head, consisting of a lion's skin to lie on, a blanket, a few shillings' worth of beads, and 10,000 shells. I lived for eight days entirely upon flour and water, being unable to procure anything else in the small villages on the steep and high chain of mountains along which we went. Three days from the Chadda the mountains cease, and the country, at this season of the year one sheet of water, is covered with grass 20 feet high, through which we had to cut a road, so that my

* "That Clapperton and Lander had visited the place, I heard from some of the oldest inhabitants.

progress in one day scarcely exceeded 5 miles. Arrived on the bank of the river, I was obliged to leave my horse behind; and after paddling about for three days in a miserable canoe, I arrived at last at the Rona town of Chubbún, where the Pleiad steamer had made a stop of a few days. I regret to say that I was unable to reach Ukali, only 15 miles farther inland, on account of the inundated state of the country. After stopping for some days at the aforesaid town, I went into the swamps of the river, living among the Rona in their miserable straw huts, in search of a curious fish, the *ajuh*, of which innumerable fables are told throughout the whole of Sudan. I found it to be a whale* about 10 feet long; living entirely on grass, and leaving the river when the water falls. I suffered very much from exposure to the wet and from bad victuals; nothing to be had but Indian meal and now and then a little hippopotamus and ajuh meat (the latter very rich). Enclosed is an accurate description of the ajuh, in German, to be translated by some zoologist in England, as I am not acquainted with the technical terms of English zoology.†

"At the end of October I returned to Bautshi, having lost my horse on the road. On my return to Gombé the Sultan presented me with a very fine animal, on which I reached Kuka on the 1st of December. I found Macguire and all my servants well; but it may give an idea of the difficulty of the roads I have travelled, that I lost no less than seven horses in the short space of ten months and twelve days. As soon as my papers and observations are sufficiently arranged, I will send them, and I hope that a caravan of the Ulad Solyman will start in about a month's time. As soon as possible I will start for Fittre, and proceed, if possible, as far as Wara. Should I, on my return in the beginning of May, find no letters or merchandise from Murzuk, and should I be unable to hear any news of the starting of a caravan, I will proceed for the west coast, if possible by way of Adamawa, and hope, with God's help, to reappear in the beginning of 1857, either at the mouth of the Cameroon or by way of Zalia on the Ebo, where I hope to find an English vessel to convey me to Fernando Po. But in case I should receive some supplies in the course of next year of merchandise, not exceeding 300 to 400 dollars in value, I will be able to follow up Dr. Barth's operations in Bagirmi, and in October 1856 start for Adamawa and the W. coast. If not, I will leave this in May, after my return from Wadai. I have *no wish* to leave the

* A manatee.—Ed.

† *See* Report of the British Association, 1856, p. 98.—Ed.

interior so soon, and will do so only on being assured that I cannot rely on any farther supplies.

"I beg to recommend to your special notice my faithful companion Corporal Macguire of the Royal Sappers and Miners, who has, notwithstanding the serious illness under which he suffered in the beginning of our journey, used every exertion to promote the object of the expedition, and behaved in the most praiseworthy manner.

"EDWARD VOGEL."

Extract of a Note from Consul G. F. Herman, Tripoli, to the Earl of Clarendon.

"MY LORD,—I have the honour to report to your Lordship the arrival here on the 14th instant of Mr. F. Warrington from Murzuk. His successor, Mr. Gaetano de Fremaux, after a long and arduous journey, reached that place on the 8th of February, and immediately assumed charge of the Vice-Consulate.

"I have farther the honour to transmit to your Lordship a copy of a despatch from Dr. Vogel, dated Kuka, 4th December last, accompanied by a description of a fish that he had discovered in the waters of the Chadda, and which he requests may be sent to some zoologist in England who understands German.

"As Dr. Vogel states to me that he had in his possession nearly 1000 dollars in money—as merchandise to the amount of 190*l.* and 100 dollars in money were forwarded to him by the last caravan that left Murzúk—and as another will not leave that place for Bornu before the end of July, if even then, I have instructed Mr. de Fremaux to retain until farther orders the 1000 dollars, which in my despatch separate No. 4, of the 8th instant, I reported to your Lordship had been remitted to Murzúk for the use of the mission; for should this money reach Kuka, as it certainly will, *after* the Doctor's movement to the southward, it would be utterly impossible to send it after him. If on the other hand the Doctor, by unforeseen circumstances, should be detained in Bornu longer than he contemplated, the money can be sent forward to Kuka. In the mean time he will have ample funds and merchandise for his present wants."

The PRESIDENT.—We are exceedingly indebted upon this, as upon many other occasions, to the Earl of Clarendon, who, as a member of this Society, loses no opportunity of communicating to us all documents relating to geographical discovery. I may, indeed, mention that I had recently the honour of waiting upon Lord Clarendon, as one of a deputation from the British Association for the Advancement of Science, with reference to the exploration of the Zambesi, when his Lordship assured us that he, on the part of the Government, was warmly disposed to offer every assistance to our enterprising and meritorious associate, Dr. Livingstone, in all his future researches; that he hoped through his agency to establish an important commerce with the natives; and that he looked upon our intercourse with the African as a subject of the greatest importance, as likely to procure for us a supply of cotton and other articles essential to the manufactures of Britain.

On a future occasion we shall have to consider a valuable memoir giving the details of Captain Burton's voyage down the east coast of Africa to the point from which he has started to pursue his adventurous journey into the interior, in which he will endeavour to determine the great question of whether there are really any lofty snow-covered mountains from whence it has been supposed the Nile may flow; or whether, as Dr. Livingstone's researches into the origin of other great African streams would suggest, the Nile does not take its source in one of the great interior lakes of that continent.

Second Meeting, Monday, November 23rd, 1857.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

ELECTIONS.—*Professor W. Haidinger, Kt., President of the Imperial Geographical Society, and Director of the Geological Institute of Vienna; and General Alberto Della Marmora, author of the Great Map of Sardinia, as Honorary Members:—and Thomas Baines, artist to the late North Australian Expedition; Septimus Beardmore; Wollaston Blake; Cheyne Brady; James Brant, Her Majesty's consul at Damascus; William Camps*, M.D.; *Lieut.-General Cannon; Captain R. Coote*, R.N.; *the Hon. C. W. Fitzwilliam*, M.P.; *Lieut.-Colonel W. C. Grant; Kirkman D. Hodgson*, M.P.; *Henry Holroyd; Richard Jefferson; Gottfried Kinkel*, PHIL. DR.; *G. B. C. Leverson; Captain F. Liardet*, R.N.; *William Loch; Matthew H. Marsh*, M.P.; *Rev. Allen P. Moor*, M.A.; *Captain J. Moore*, R.N.; *the Hon. W. Napier; Captain A. Phillimore*, R.N.; *W. H. Sitwell; Captain J. H. Speke, of the East African Expedition; Robert Tait, and Professor Tennant, were elected Fellows.*

PRESENTATIONS.—The Rev. G. R. Gleig and Messrs. F. S. and W. H. Homfray were officially introduced upon their election.

DONATIONS.—Among the donations since the previous meeting were 'Dr. Livingstone's Travels in Africa,' 'Perez-Rosales' Work on Chili,' 'Magnetical and Meteorological Observations made at the East India Company's Observatory, Bombay,' 'Fullarton's and Blackie's Atlases,' 'Transactions of the Academy of Sciences of Paris and of the Royal Society of London,' &c.

EXHIBITIONS.—A plan in relief of a portion of the Pyrenees, by the Rev. Pastor Frossard, of Bagnères-en-Bigorre; Native MS. map of Delhi; map of Cawnpúr, by Captain Yule, F.R.G.S., of the Bengal Engineers; and Stanford's map of Havelock's campaigns, &c., were exhibited.

ANNOUNCEMENTS.—The President read a letter which had been received by the Secretary, through Colonel Everest, from his friend Lieutenant-Colonel Andrew Scott Waugh, Surveyor-General of India, returning thanks for the Society's Gold Medal, which had been awarded him for the great Trigonometrical Survey of India.

10, Westbourne Street, Hyde Park,
19th November, 1857.

SIR,—I send you some extracts of letters which I have recently received from Lieut.-Colonel A. S. Waugh, which I request the favour of you to lay before the Council as soon as may be convenient to you.

GEO. EVEREST.

To Dr. Norton Shaw, Sec. R. G. Society.

Surveyor-General's Field Office, Deha Dun,
29th July, 1857.

My dear Colonel Everest,—I have this moment received your very kind letter of the 2nd June, announcing that the Royal Geographical Society have conferred on me their Gold Medal of the season, and as the most agreeable mode of transmitting it have selected you as their medium.

It is with great pride and gratification I thus learn that my geodetical labours in India have received this honourable mark of approbation from so distinguished and learned a Body as the Council of the Royal Geographical Society, and the pleasure I naturally feel on the occasion is doubled by my old and revered commander having been selected as the medium of transmission: for to your instruction and example I am proud to acknowledge that I owe whatever merit my labours may possess.

I am sure that this honourable distinction conferred on its present head will operate, if possible, as an additional stimulus to every member of the Survey Department to endeavour to merit the approbation of the Royal Geographical Society, by unremitting perseverance in their arduous labours.

I also feel that on an occasion like this it is necessary, with due regard to truth and justice, that I should publicly acknowledge that the merit is not entirely mine, and that although the medal has been conferred on the head of the Department, I ought to share the credit with several of its members, by whose zealous co-operation I have been enabled to effect so much. Major Tailyour, my late astronomical assistant, the friend of my early days, and my associate in so many wanderings and arduous labours; also the late Mr. George Logan, 1st assistant; Mr. J. Peyton, late chief civil assistant; Mr. W. Scott, chief draftsman in the field, and Mr. James Mulheran; all of whom, like myself, were trained up by you, have borne a large share in these interesting operations. Of those who have been trained by me in the principles laid down by yourself, I would also beg leave to enumerate Lieutenants J. Walker, J. Tennant, D. Nesmyth, T. G. Montgomerie, Mr. J. Hennessey, and Major Strange, to whose co-operation I am largely indebted.

Lieut. Montgomerie and Lieut. James Walker have especially distinguished themselves in the extension of our geographical researches on the north-western frontier, labours which, by bringing the accuracy of modern trigonometrical operations, depending on a known linear unit and point of departure, to bear on regions hitherto unexplored, or imperfectly known, have a peculiar interest and value. These officers possess remarkable talents for geographical research, as also Lieutenants Elliot Brownlow, and Bassevi, who have recently joined the department, and are now employed with Lieut. Montgomerie in that part of Tibet beyond Kashmir. In all these operations I should also again acknowledge the great assistance I have derived from Mr. W. Scott, chief draftsman, to whose vigilance, and that of Mr. J. Hennessey in detecting errors, I am greatly indebted.

I must also in justice express my warm acknowledgments to my worthy and talented deputy Major Thuillier, for his aid and co-operation in the anxious task of administering this widely extended department, and the cordial interest he has ever evinced in our geodetical labours.

Allow me, in conclusion, to beg one more favour at your hands. My wanderings in Indian jungles have little fitted me to address learned bodies, nor, surrounded as we are now by all the confusion of a military rebellion of unprecedented magnitude, do I feel that I could do justice to it, anxious as I am for the safety of our standards and records. Will you then do me the great favour to express my best thanks to the President and Council of the Royal Geographical Society for the honour conferred on me, and the Great

Trigonometrical Survey of India, and believe me always very gratefully your affectionate attached friend,

(Signed) A. S. Waugh.

27th August, 1857.

I have a good paper on the stocks now, on the Himalaya Peaks, which, I think, will do for the Royal Geographical Society; but the unsettled state of the country, and the inundated state of the roads, make it hazardous to forward any valuable documents, while our own precarious position here is equally an objection the other way. I hope we shall be able to carry on our work without interruption. The Kashmir and Tibet Survey is progressing beautifully, and will make a lovely topographical map, which it will do your eyes good to behold. Montgomerie and Elliot Brownlow have just fixed two peaks on the Kara-Korum, one of which is 27,928 feet high, according to their field computations, its distance being 136 miles from our last stations. This would indicate the peak to be the 3rd highest yet measured. The Kashmir series has twice crossed the snowy range, with two stations each time on it. It is syonmetrical and double, and a noble achievement, worthy of your successors.

A. S. Waugh.

The first Paper read was:—

1. *Progress of the British North American Expedition, under the command of* Capt. John Palliser, F.R.G.S.

Communicated by the Rt. Hon. H. Labouchere, M.P., F.R.G.S., H. M.'s Secretary for the Colonies.

Sault Sainte Marie, 10th June, 1857.

Sir,—I have the honour to report my arrival here at 4 o'clock this morning.

We started from Liverpool in the Arabia steamer, which left England at 3 P.M., May 16th, and landed at New York at 6 P.M. on the 28th May.

Immediately on landing we experienced some difficulty with the Custom-house at New Jersey (*sic*), and subsequently * were enabled to pass our instruments through, owing to the kind assistance of Mr. Pompelly of New York, whose acquaintance we casually made at our hotel next morning. Mr. Pompelly, aided by Mr. Wheatley, well known in the scientific world as an accomplished mineralogist, accompanied us on the 29th May to the Custom-house, and having explained the object of our expedition, and representing it as one directed by Her Britannic Majesty's Government, these gentlemen at length succeeded in accomplishing our object of passing the instruments, saddles, guns, &c., but not until they had called on the solicitor of the customs and conferred with the superintendent and

* The American authorities had probably not been apprised of the expedition.—Ed.

several of the subordinate officers of the Custom-house. I have entered into these minutiæ, as I consider the kindness of these two gentlemen and their anxiety in the furtherance of international science deserving of the highest praise.

I am much concerned at having to report about this date the bursting of one of our new barometers. I am fully convinced that this accident has not occurred from the relaxation of Dr. Hector's vigilance over the barometers, which has been most unremitting. I therefore had the instrument examined by the first makers in New York, who agreed that it might have arisen from the tightness of the metal fittings enclosing the cistern, which prevented its due expansion with a great rise in temperature, such as we experienced on landing at New York.

Mr. Pompelly, however, most kindly applied for us, and obtained one of the New York Observatory barometers, until such time as ours could be repaired and forwarded to Carlton House, or be otherwise reclaimed.

On the morning of the 2nd of June we started for Detroit *viâ* Elmira and the Niagara Falls. At Detroit we were detained several days, as the steamer to the Sault Ste. Marie had not yet returned; she, however, arrived on Saturday the 6th, reporting much ice still floating on Lake Superior, and also that Sir George Simpson was still detained at the Sault Ste. Marie by the ice. We have, therefore, no longer any reason to regret the delay of our departure from England, as all progress, owing to the very unusual lateness of the season, would hitherto have been denied us.

On my arrival this morning at the Sault Ste. Marie I found my two birch canoes and sixteen rowers awaiting me, and have made an arrangement with the captain of the steamer to take us up, with men, boats, luggage, and all, to Isle Royale, and, as the steamer is now starting, I conclude my Report, and remain, &c.*

Fort Garry, Hudson Bay Co.'s Territories,
16th July, 1857.

Sir,—In continuation of my Report, dated Sault Ste. Marie, June 10th, 1857, I have now the honour of acquainting you with our farther progress.

Owing to the unusual lateness of the season, Lake Superior was crowded with floating ice, offering great difficulties even to a steamer; and, after consulting experienced persons, I determined to accept the further assistance of the steamer Illinois, whose cap-

* The expedition had arrived at Pembina on the Red River in July, 1857.—Ed.

tain agreed for the sum of 300 dols. to take up my two canoes on deck, 16 voyageurs, and ourselves across the Lake, and leave us near Isle Royale, about eight hours paddling distance from Fort William.

Although this might have appeared a large sum (*i.e.* 61*l.* 5*s.*), yet subsequently I had reason to congratulate myself on adopting that course, for shortly after the men and canoes were taken up, we came on fields of ice, and the captain, after pushing his way for several miles, fell in with a schooner that warned him to return and try a course along the north shore of the Lake. At length, after deviating 70 miles from his course, he succeeded, and came in sight of the island at daybreak of the 12th of June, four miles to the N.E.

We then launched, loaded, and started in our canoes, having avoided not only seven or eight days' journey, but also the risk of being stopped altogether by the ice.

We reached the mouth of the Kaministoquoiah at nightfall, and arrived at Fort William at 10 P.M. on the 12th of June, where we learned that Sir George Simpson had only preceded us eleven days, having been eight days on the north shore of Lake Superior, where his canoe had been broken on the ice.

On Saturday, 13th of June, we started, and encamped some miles from the Fort, and on Sunday the 14th arrived at the mouth of the White Fish River. I halted here, and, according to my instructions, organised a party, consisting of myself and Dr. Hector, three voyageurs, and three Indians, and ascended the White Fish River. I chose these small birch canoes on account of their drawing but very little water; they could merely carry two paddlers and one passenger each, while the third, with two paddlers, took the provisions for the party, consisting of eight people in all.

I can readily understand why the existence of this river has been denied, as its mouth could be easily passed unobserved by those only travelling in canoes on the Kaministoquoiah, owing to its taking a sudden bend before flowing into that river, and therefore appearing much like a recess of the Kaministoquoiah.

The White Fish River varies in breadth from 40 to 60 yards, and is 5 feet deep at its mouth, but useless for purposes of navigation owing to the frequency of the rapids. We punted up a considerable portion of the stream at intervals when the rapidity of the river prevented us from paddling. In the first day of our journey up the river the barometer indicated a proximate ascent of 75 feet in 12 miles, and on the second day a farther rise of 100 feet in 6 miles. Here a very large tree fell on one of the canoes and

dashed it to pieces, I myself narrowly escaping by jumping out of the way. The rain was very severe, and the men very much exposed, being obliged frequently to get out up to their middles in water to assist in bringing up the canoes.

Owing to the accident which befel our boat with the provisions, we were obliged to return the next day.

Dr. Hector and I started accordingly on foot at 6 A.M., June 14th, straight through thick woods, in the direction of the Falls of the Kakebeka, distant, by our calculation, 27 miles, taking two Indians with us, and sending back the remaining canoes with the third Indian and the three voyageurs to the camp at the mouth of the White Fish River, with directions for the whole party to go on to the Falls of Kakebeka and meet us there.

On leaving the course of the White Fish River we ascended a steep bank into a region of larch woods, and, contrary to our expectations from the previous reports, found no difficulty in pushing forward at the rate of 3½ miles through the country intercepted between the White Fish and Kaministoquoiah Rivers, and if we could take our experience of that portion of the country for a fair average of the whole, I do not apprehend any difficulty in connecting, either by means of railroad or a common road, the country around Fort William with the south shore of Sturgeon Lake; but the accident which occurred to our boat and provisions took place before we reached the waterparting which must necessarily exist between the head of White Fish River and the waters which flow into Lake Winipeg, and therefore it still remains to be seen what amount of difficulty to overcome the waterparting will present at that point, compared with that which it offers, both on the Old Portage Route and the Northern Portage Route, which we have followed.

All this time heavy rain fell with little intermission, and detained us for several days after we had arrived at the Kakebeka Falls.

On the 23rd we reached the height of land, and next morning crossed the Savannah Portage into the Savannah River, and commenced the descent of the water-parting towards Lake Winipeg.

On the 1st July we arrived at Fort Francis on Lac la Pluie or Rainy Lake, and, while at breakfast in the fort, a large number of Indians formed a deputation, headed by their chiefs with their soldiers, and led by the old chief of the Lac la Pluie nation. It seems that they had heard a rumour of my arrival, and had organized this deputation for some time previously.* This fact I would not have taken up your time by dwelling on, were it not for the high tone which the

* See Note at p. 50. Ed.

old chief took in his harangue, which contained in it more than the mere ordinary imagery with which they make speeches for the sake of obtaining presents. He said, "I do not ask for presents, although I am poor and my people are hungry, but I know that you have come straight from the great country, and we know that no man from the Great Queen ever came to us and lied. I want you to declare to us truthfully what the Great Queen of your country intends to do to us when she will take the country from the Fur Company's people? All around me I see the smoke of the white man to rise—the 'Long Knives' (*i.e.* the Americans) are trading with our neighbours for their land, and they are cheating them, and deceiving them. Now, we will not sell or part with our lands."

It was of no use to try and cut him short by any assurances that I was not employed to treat for the sale of his lands, and I told him confidently that if he did not wish to part with his lands, and also if he and his people behaved as always they had done, that is quietly and peaceably with the white faces, I would assure him that the Queen would never send soldiers to deprive them of their lands by force.

Here an Indian (not of their nation, but of a friendly neighbouring tribe) muttered to him in a low tone, "Make him put it into writing on a piece of paper; make him, I say: and now I have said it, for it is nothing to me one way or the other, but I know the whites on the other side where we are, and I say make him put it into writing." But the orator said aside to him, "No; what he will say he will keep to!"

"Now," continued he aloud, "what is to become of us? We have no more animals; they are all gone; and without skins the Company will not give us goods from their store; and only for the little fish we take we would starve, and many of us do starve and die." I answered that they were to blame for not endeavouring to cultivate their lands, and find other resources for maintaining themselves besides hunting. He answered, "There are none to show us, and we have no implements to do it with." He then objected to M. Bourgeau collecting plants, and requested that Dr. Hector should not take away any mineral specimens as long as we were in his territories. He also begged that the Great Queen might be made acquainted with their unhappy condition, and that she might know that his heart was grieved by reason of all those of his children who died by hunger. He asked me to promise that I would acquaint the Great Queen of these things, and to see her myself. But I satisfied him that I would write his words to the

big men that were in the habit of giving good advice to the Queen, and so we parted good friends.

All this, insignificant as it may appear, was of some importance to us, as the chiefs, with their old leader and orator, were highly excited. There were upwards of 200 Indians inside the fort, 100 of whom were armed, and our party consisted of myself and interpreter and my three companions, and the agent and storekeeper of the fort.

The conference lasted $2\frac{3}{4}$ hours, in which period I heard and replied to five speeches, and the gentlemen in charge of the post seemed greatly relieved at the Indians quietly leaving the fort on the successful issue of the conference.

On the 5th July we camped on Sturgeon Lake, at the mouth of what has hitherto been called Sturgeon River, and, according to my instructions, I started with Dr. Hector to explore back again in a S.E. direction towards the White Fish River. We had not proceeded far when what appeared merely a river turned out to be a passage to a very large lake.

We pushed across in an easterly direction and searched the opposite shore for an outlet; found a very fine waterfall, and walked up the woods without much difficulty for about a mile and a half, when we came on another lake whose dimensions appeared not far inferior to those of the first. And from all I have seen both immediately on the route and whenever I have deviated (which I have often on foot for hours while the men were resting or cooking), I have come to the conclusion that the whole country between the waterparting and Sturgeon Lake is but a mass of lakes and islands. The traversing of this country can only be effected in winter by means of sledges and snow shoes when the lakes are frozen, and the underwood, the swamp, and fallen timber are filled up by the snow, over which there is then no difficulty in travelling on snow-shoes; and I was aware that this was not the proper season for carrying out the investigation on account of the large staff of men, canoes, and provisions which I would have required, and the details of which (*i.e.* those connected with running a road through a woody, swampy, and lake country) would be far better carried out by a professional engineer with a sufficient staff of assistants and lumberers — the providing of which would perhaps more immediately be the duty of the Canadian than of her Majesty's Government at home. It is much to be regretted that so many miles of deep and valuable watercarriage should be rendered unavailable by so great a number of small insignificant portages. Many of these difficulties, however, are to be overcome by engineer-

ing at but a trifling expense, and if ever the country becomes inhabited it will hereafter enjoy much facility for steam-boat communication.

On Wednesday, July 8th, we reached the Island Portage, the last on the route, whence there is uninterrupted communication by water all the way across Lake Winipeg. to Lower and Upper Fort Garry, and as far as Fort Pembina on the other side of the frontier.

We reached Lower Fort Garry on Saturday, 11th; rode to the English Protestant Church on Sunday, about 4 miles distant, and were much surprised to find a large attentive congregation of Scotch people and half-breeds of various shades of colour.

The summer here is very warm, and crops seem quite, by the rapidity of their growth now, to make up for the long dreary winter of this country. . . . .

Thunderstorms are of frequent occurrence here, and though apparently not severe, yet frequently fatal to human life. While I was writing the above a flash of lightning has fallen on an Indian tent and killed one man and three women; I found two of them fearfully burnt, but the remaining two, though quite dead, are seemingly untouched. I have myself frequently, on Lac la Pluie and elsewhere on the route, observed the lightning to flash upwards from the earth to the impending cloud, when it often presents the appearance of a forked string of bright beads.

I purpose leaving this on Monday morning, with Dr. Hector, Mr. Sullivan, and M. Bourgeau, and 13 men, all well armed. We shall go as far as the frontier at Pembina, and thence along the boundary to Turtle Mountain, thence to Beaver Creek, and from thence right across to the elbow on the Lower Saskatchewan. My horses, about 30 in number, stand me an average of 20*l.* each, and the men's wages at the rate of 40*l.* per year. Traversing the Lower Saskatchewan is, I regret to say, not unattended with danger. Sir George Gore was reported as having been decoyed into a conference with the Sioux, about a year ago, and he and his party were robbed of their baggage, horses, clothes, arms, and ammunition, and he himself without even a shirt was obliged to take refuge at Fort Union, fortunately not too far away to enable them to reach alive.

I have the honour to inclose you my Secretary, Mr. Sullivan's, astronomical observations, and I have desired Dr. Hector to communicate his geological researches to Sir R. Murchison.

M. Bourgeau has been most successful in his botanical collections, and is preparing a case of flora and seeds for Sir William Hooker, which I trust will arrive safely in England before the end of October next.

I have endeavoured to embody as many of the principal incidents recorded in my journal as the short space in an official letter will permit, and I hope to have the honour of continuing this Report as soon as I have reached my winter quarters at Fort Carlton.

I have, &c.

Fort Pembina, Hudson-Bay Co.'s Territories,
27th July, 1857.

Sir,—In continuation of my Report of the 16th July, I have the honour to inform you of the departure of the Expedition from Fort Garry to Fort Pembina on the 21st instant.

I have now engaged 12 men, 30 horses, 2 small waggons, and 5 carts. In consequence of the absence of buffalo in this portion of the country, I am obliged to carry along with me a considerable quantity of provisions to last until we arrive sufficiently far to the westward to fall in with these animals. For this purpose I found the small, heavy carts of the country not sufficient, and, contrary to the advice and prejudices of the people, bought two small American waggons, and have found them most efficient.

I was not disappointed with the class and condition of the horses obtained for me by the Hudson Bay Company, as I have all along been aware that the half-breeds of Red River have taken their best horses to the summer buffalo-hunt.

I have, in order to save as much extra travelling as possible to the horses, sent on four men with four carts and ten horses straight to Beaver Creek, with orders to await our arrival in that quarter; while Dr. Hector, Mr. Sullivan, and myself take the route thither *viâ* Pembina and Turtle Mountain. This arrangement will serve to recruit my horses, whose pasture hitherto has not been good.

On leaving Fort Garry we crossed the river Assineboine, and proceeded up the Red River for nine or ten miles in a course a little east of south, through copse and light timber. We crossed the river Sall (*sic*) 9 miles from Fort Garry, a river about 25 yards wide, but not put down on the maps. Shortly after this we emerged on the open prairie over a well-defined road indicating a far greater amount of traffic than I had expected to find.

Owing to the peculiar distribution of the wood, which consists chiefly of fine oak-trees, confined principally to the right bank of the river, the tortuous course is very distinctly marked by jutting promontories, called by the people "points." I observed that the agricultural resources of the country were not merely confined to Red River settlement; for the country through which

we passed assumed fully equal, and in some places even superior, advantages, being more elevated above the river. I had an opportunity of noting the nature of the soil, where a settler was digging for marl, about 6 feet deep, and again at Pembina, where I had a special examination made. It consists of about 1 foot of black vegetable mould resting on a free clay loam of a light grey colour, but very deficient of sand. The banks of the rivers in this country are composed of remarkably tenacious clay mud, rendering access to them very difficult, and great care is required in passing a cart or waggon across. On the 22nd we crossed Rivière qui Grate, situated 38 miles south of Fort Garry: this river, as well as the river Sall, we passed in pontoons. The ferryman here was a very intelligent American, who had recently arrived in the country by a route from the Lake of the Woods, following the course of Reed Grass River.

He described the first 25 miles, west of the Lake of the Woods, as being flat and swampy; he partly paddled and partly dragged his canoe over a slightly rising country, until he reached Reed Grass Lake, out of which a river of the same name flows; the country about the head waters of this river is swampy: but the lower half of its course, according to his account, flows through a dry and finely-wooded country; he described the river as shallow and swift, only fit for very small canoes.

I observed large pieces of driftwood scattered about the higher spots of the prairie, indicating the extent to which the whole country is flooded in spring; by measurement I ascertained that, last spring, the water rose 35 feet above the present level of the stream, and it is by no means unusual for the flood to reach 10 feet higher. Opposite Fort Pembina the river is about 80 yards wide and 12 feet deep; in dry seasons it falls 5 feet lower. From Mr. Iddings (an American civil engineer, whose name will appear in this despatch) I ascertained that the river is 15 feet deep 200 miles farther up; but there its width is reduced to 90 feet, and the frequent occurrence of sharp bends in its course would make it difficult to ascend in steamboats.

The mouth of Pembina River, which flows from the west into Red River, is situated about 2 miles south of the boundary line. Upon this river, at a distance of about 25 miles from this, I am informed that there is a thriving American town, called San Josef's, which, owing to its recent establishment, is not yet recognised in our maps.

On Friday, July 24th (the day after my arrival here), my secretary, Mr. Sullivan, and I took the meridian altitudes of the sun, in order to find the locus of the 49th degree of north latitude, and to determine the direction of the boundary line.

We were shown at the same time a post driven into the earth to indicate a similar observation taken by Mr. Nicolay (*sic*), an American gentleman well known in the American scientific world.

The result of our observations differed by 370 yards, the American observer's result having been in favour of her Majesty.

On this occasion I availed myself of the valuable assistance of Mr. Iddings, the gentleman to whom I have alluded above, and who is commissioned to lay out lots of land from the frontier line southward, purchased by an American Land Company; and this gentleman, with my secretary, Mr. Sullivan, placed another post at about 300 yards in the direction of true west, making the necessary allowance for the variation of the compass here, which Mr. Sullivan found to be 14° E.

Mr. Iddings informed me that the land company by whom he is employed intend to build a town here, and establish a railway station about two miles distant from the posts, whose positions we have established. As yet the place is but a wild waste. The Hudson Bay Company's Fort, where we have been residing for the last two or three days, is a very small establishment, and the American one, situated about two miles on the other side of our present line, is still smaller and more wretched in appearance.

It however professes to be a post-office, and carries a mail, said to be a monthly one, from St. Paul's; but as the postmaster is away at present, and left the place under care of an Indian woman, who speaks no other language but her own, consequently I cannot form very accurate ideas as to the safety of any letters committed to its care. Still, however, I am induced to forward these by the assurance of an intelligent half-breed, who told me that the post-office here is "a very lucky one."

Enclosed is a note of the observations made on the direction of the boundary line, drawn up and signed by myself and the two gentlemen engaged in the survey.

I have, &c.,

JOHN PALLISER, Captain.

H. M. Secretary of State for the Colonies.

Extract from Private Letter from Mr. PALLISER, *dated 27th July*, 1857 :—

"I forgot to mention in my letter to Mr. Labouchere that the town which the Americans are about to build at our frontier line, is to be called St. Vincent. Mr. Iddings, the American engineer, told me, that as soon as he returns to St. Paul he will produce his map of the projected town and railway station, and they (the members of the Land Company) proceed to name the streets. I think I was just in time with my observation on the Boundary Line, and in coming to an understanding with the American engineer, which may perhaps be the means of avoiding unpleasant disputes by-and-bye."

Note of Observations at Pembina by Captain PALLISER, Mr. IDDINGS (*U. S. Civil Engineer*), *and* Mr. SULLIVAN :—

An observation taken at the above place by Mr. Nicolay (*sic.*) in 1848-49, places a post in latitude 49° N.

An observation taken by Captain Palliser places the same post in latitude 48° 59′ 49″ N.

Mr. Iddings and my secretary, Mr. Sullivan, after ascertaining the variation of the compass, erected a second post distant from the first 370 yards due east, thus determining the direction of the Boundary Line.

(Signed) JOHN PALLISER, Captain, F.R.G.S., Commanding British N. American Expedition.

(Signed) C. W. IDDINGS, C.E., (U. S.)

(Signed) JOHN W. SULLIVAN, Secretary and Astronomical Assistant to the Expedition.

Locality.	Bar.	Ther.	Longitudes.	Latitudes.	Variations.
		°	° ′ ″	° ′ ″	° ′
Trembling Portage ..	29·1	61	89 59 48 W.	48 31 5 N.	6 21 E.
On Kaministoquoiah ..	28·9	56	89 58 10 W.	48 40 00 N.	5 14 E.
In Lat. 48° 45′ N. ..	28·8	57	89 53 0 W.	48 45 00 N.	8 54 E.
In Lat. 48° 45′ N. ..	28·75	69	89 53 48 W.	48 55 00 N.	9 5 E.
Savannah Portage ..	28 62	84	90 5 0 W.	48 53 00 N.	6 53 E.
Perch Lake	28·44	81	91 12 0 W.	48 35 00 N.	8 14 E.
In Lat. 48° 27′ N. ..	29·05	51	92 30 0 W.	48 27 00 N.	9 53 E.
Fort Francis	29·0	85	93 30 0 W.	48 36 00 N.	9 31 E.
In Lat. 48° 50′ N. ..	29·45	83	93 58 0 W.	48 50 00 N.	11 20 E.
In Lat. 49° 26′ N. ..	29·39	85	94 48 0 W.	49 26 00 N.	10 17 E.
In Lat. 50° 15′ N. ..	..	..	95 17 19 W.	50 15 00 N.	15 7 E.
Lake Winipeg	..	..	96 34 0 W.	50 33 48 N.	14 41 E.
Ditto	..	..	96 30 25 W.	50 23 48 N.	14 9 E.

N.B.—The Tabulated Longitudes are not deduced from the Tabulated Altitudes —the *Variations* only.

(Signed) JOHN W. SULLIVAN, Secretary to the Expedition.

Approved as correct,

July 17, 1857. (Signed) JOHN PALLISER.

Locality.	Bar.	Ther.	Latitude.	Longitude.
		°	° ′ ″	° ′ ″
Fort William	29·5	64	48 24 10 N.	89 26 10 W.
Trembling Portage	29·1	61	48 31 5 N.	89 59 48 W.
Dog Portage, west end	28·8	57	48 46 11 N.	89 54 45 W.
Dog River, right bank	28·75	69	48 56 0 N.	89 54 48 W.
Savannah Portage	28·62	84	48 53 2 N.	90 13 46 W.
Barrier Portage	28·85	79	48 45 58 N.	90 51 24 W.
French Portage	28·39	79	48 40 0 N.	91 11 30 W.
Camp Portage	28·37	81	48 15 57 N.	92 28 28 W.
In Lat. 48° 27′ 5″ N.	28·4	94	48 27 5 N.	92 30 4 W.
Fort Francis	28·41	73	48 36 15 N.	93 33 33 W.
Rainy River, left bank	28·5	86	48 50 0 N.	94 14 19 W.
Portage de Bois	29·06	86	49 26 8 N.	94 48 7 W.
Winipeg River	29·0	89	49 55 0 N.	94 45 30 W.
Do., right bank	28·95	92	50 15 6 N.	95 17 19 W.
Lake Winipeg, south side ..	29·0	93	50 22 58 N.	96 30 25 W.

(Signed) JOHN W. SULLIVAN, Secretary to the Expedition.

Approved as correct,

July 17, 1857. (Signed) JOHN PALLISER.

The PRESIDENT.—We return our thanks to Mr. Palliser and his associates, and also to the Secretary of State for the Colonies, for his kindness in communicating these original documents to the Royal Geographical Society. It must be very gratifying to receive these important communications, knowing, as we do, that *the expedition originated entirely with this Society*. From what we have heard of the progress that has been made, I think we may expect the most valuable results not only to geographical and magnetical science and natural history, but also for the benefit of the nation, in clearly defining the line of boundary between the United States and the British possessions. The labours of the expedition will be still more valuable when they are extended to the Rocky Mountains, in order to discover whether there be not a passage in our own territories to Vancouver Island, that important station on the Pacific which is so full of coal and other products. Mr. Palliser and his scientific associates will examine thoroughly the geological and mineral structure of the Rocky Mountains and of the lands extending to the Pacific, and also describe the animals and plants of the whole region.

The Rev. Mr. NICOLAY, F.R.G.S.—It may interest this meeting to know that another expedition has been traversing the same country this summer, sent out by the Canadian Government, and led by Mr. Gladman, to examine the country between Lake Superior and Lake Winipeg. I regret that Mr. Palliser should have been delayed in the examination of this district, seeing that a sufficient staff had been sent out for the purpose by the Canadian Government, which had voted 5000*l.* for the purpose, and that it had been frequently traversed before. By far the most important part of the country is that which Mr. Palliser is now examining. Whatever may be the character of the country between the two lakes, it must be a long time before it can be of political interest as compared with the country to the west of Fort Garry. The last despatch of Captain Palliser shows that; and it shows also how the people of the United States are creeping up towards the boundary and settling there. There are some points to which I would draw the attention of the meeting. With reference to the country between Lake Superior and Lake Winipeg, where Captain Palliser speaks of a district of larch woods, about 27 miles in length, between the White Fish River and the Falls of the Kaministoquoiah. Now, that being

to the east of the water parting is an important fact, because it shows that there is a large district within the present limits of Canada fit for the habitation of civilised man. More than this, Mr. Salter, provincial land surveyor, who was sent out by the Canadian Government, writes to the effect, that in running an exploring line from Lake Nipissing to Backewanaung Bay, on Lake Superior, he came on a magnificent tract of country abounding in every requisite for immediate settlement—well watered, admirably timbered, with maple, beech, iron wood, and other hard woods, and easily accessible. I need not say how important this territory will be to Canada, but I may remark that it entirely bears out the report which Dr. Bigsby made of what he saw and heard in passing to the north of Lake Superior, with respect to this very region, which he calls, I think, the Sugar-Maple District. Mr. Gladman seems to be highly satisfied with the country which he examined. He pursued the same route as Palliser, but at a later period of the year, and he reports it as extremely fertile and good: he measured trees 9 feet in circumference. He also speaks of meeting Indians, as Mr. Palliser does; and I confess I wish we had before the Society an account of what transpired between Palliser and the Indians, because from what happened to Mr. Gladman I should be led to think that Mr. Palliser had communications of considerable importance with them, which may render necessary the immediate interference either of our own Government or of the Canadian Government. In connection with this subject I may mention that in this morning's papers there was an account of the Mormons stimulating the Indians of the plains to attack and destroy the troops of the United States on their road to Utah. This is not on the usual route to Utah, but on the northern route by the Missouri, so that the Indians are in a state of insurrection, if not on our own boundary, at all events immediately to the south of it.*

A word dropped from you, Sir, which I hope means all that I think it does. You spoke of the expedition crossing the Rocky Mountains. I had fears that the expedition was to terminate at the Rocky Mountains.

The PRESIDENT.—No, no.

Mr. NICOLAY.—I am glad to hear that that is not the case.

The PRESIDENT.—On the contrary, they have the most minute instructions to examine the whole of the opposite face of the Rocky Mountains.

Mr. NICOLAY.—But not to go much beyond that?

The PRESIDENT.—They are to go to the sea-board on the Pacific.

Mr. NICOLAY.—My reason for asking is this:—In the evidence lately given before a Committee of the House of Commons, a great deal was said about a district called "Thomson's River District." Thomson's River flows into the Fraser River about latitude 51. Now the report of that district is, that it is one of the most fertile and admirable for settlement in the whole of North America. It is very desirable that our expedition should cross that district to ascertain whether it is so or not; and, especially, if it be true that the people of the United States are coming from Oregon, and finding gold in very large quantities there, as stated in the Blue Book.† For many years I have had a knowledge of what is now called Thomson's River District, and I know its agricultural value to be great, though probably it is not superior to the country between it and the Rocky Mountains: of its mineral wealth I know no more than has been stated in evidence, but surely it is a most important thing that the expedition should go and ascertain the fact, if it be so. It is also distinctly asserted by those who ought to know that there is no practicable pass in the

* Here, at the request of the President, the passage of the original document, inserted in brackets at pages 41 to 43, was read.—ED.

† This is also mentioned in the Report of the Superintendent of the Coast Survey of the United States, with reference to the population of the Washington territory.

Rocky Mountains for about 180 miles from the Kootonais Pass to that between Mounts Brown and Marker. I appeal to geographers whether there is a range of mountains in this earth which has no practicable pass in 180 miles? I have no knowledge of such a range, and I again appeal to the geographers present, and ask whether there is such a range, except it be the Rocky Mountains? I feel sure, therefore, that Mr. Palliser will find one; but if he does not ascertain the character of the country between the Rocky Mountains and the Pacific, he will come back without his laurels. For myself I think that the most important object of the expedition. And I venture to add that Government should be urged to extend the expedition to the mouth of Fraser's River, in the Gulf of Georgia, as it would be a most desirable thing both for the ends of science and for the interests of the country at large.

[Here was read an extract of a letter from Mr. Sullivan, in which the word *sceptre* occurred.]

Col. Lefroy, F.R.G.S.—I must venture to express a little doubt as to the fidelity of the report of Mr. Palliser's conference with the Indians. His interpreter must have taken some little liberty with the subject, for I doubt whether any American Indian ever talked of his sceptre or of his subjects. The government among the natives is not a monarchical one, nor are the people in the position of subjects towards their chiefs. However, that is little to the purpose. With regard to the state of distress among the Indians, it arises from causes not within the control of the Hudson Bay Company. It arises from the unproductiveness of the country. It is not frequented by any large animals, but almost entirely by rabbits. The Indians live principally on rabbits, and clothe themselves in rabbit skins. They also partly subsist on sturgeon, which they catch at times in the lakes. Sometimes they are well fed and sometimes they are in a state of lingering starvation; but this does not imply neglect on the part of those who are the temporary guardians of that territory. A considerable amount of agriculture has been practised among the Indians on the Rainy Lake. Wherever they have perseverance and diligence enough to devote themselves to garden culture they succeed; they grow potatoes, herbs, and other produce to some extent. But as a general rule, as everybody knows, they are very destitute, because they will not labour. They prefer starvation to work. I say this to turn the edge of what might seem an imputation on the rulers of those regions. With regard to Captain Palliser's account it must not be supposed that ice on Lake Superior on the 12th of June is a common thing. The last was an unusually severe winter. Generally speaking, the lake is free from ice in May. The ascent of the White Fish River is highly interesting, because if a navigable communication with Lake à la Crosse can be established by that stream it will shorten the present distance 40 or 50 miles. Looking, however, to its very short course, it can scarcely be navigable any distance: the Kakebeka itself, with numerous feeders and draining a comparatively large area, being frequently so low as to occasion many difficulties to the canoes. I hope I shall not be considered to have impugned Mr. Palliser's fidelity or veracity. That little point struck me, and it occurred to me that the imagination of his interpreter rather ran away with him. That the address is given with substantial accuracy I do not for a moment doubt.

Dr. Hodgkin, F.R.G.S.—Though I agree with Colonel Lefroy that the Indians are not ruled with sceptres, yet I think the whole of the speech could not have been an invention on the part of the interpreter. It speaks of Indians having resided for several generations on that spot, therefore I think it must be more than merely a rabbit warren. The fact that the "long-knives," the Americans, are creeping up and settling on the territory shows that it must be habitable. I am much inclined to believe that the natives have very much suffered in consequence of what has been going on, perhaps very naturally,

The trade in furs, we know, must exhaust the large and valuable animals; and as the Indians are not an agricultural people, they are very likely to suffer. The tendency of the evidence is to show that they have deteriorated in consequence of the mode of management to which they have been subjected. I do not say this to complain of any persons, but to express my strong desire, that while this portion of our dominions continues to claim the attention of Government, as a country capable of supporting man, and of being turned to profit for the English nation, the aboriginal inhabitants may not be lost sight of. Sympathy is expressed in high quarters with regard to them, but it has been a barren sympathy. Up to the present time it has not in the slightest degree arrested their decline. I have had the opportunity of conversing with the Bishop of Rupert's Land, and of corresponding with persons in that and the adjoining territories, and I know there are individuals who feel for these aboriginals. But the prevailing policy is decidedly hostile to their well-being, a fact which is greatly to be deplored.

Mr. Nicolay.—Let me remind the meeting that Mr. Palliser is no novice in Indian life. He spent two years amongst the Missouri Indians, and this is not the first conversation he has had with the natives. Therefore we may conclude that this Report is substantially correct, though it may have verbal inaccuracies.

The President.—I am glad Mr. Nicolay has pointed out the qualifications of Mr. Palliser for this undertaking. He is indeed thoroughly acquainted with the American Indians. Having been a successful buffalo hunter, accustomed to the Indian sports, and having mixed much with the natives, I have not the least doubt that we shall have to thank him eventually for great geographical results.

The second Paper read was:—

2. *Notes from the Journal of the East African Expedition, under the command of* Capt. Richard F. Burton.

British Consulate, Zanzibar,
22nd April, 1857.

Sir,—I have the honour to forward, for the information of the Royal Geographical Society, a field-book, containing our route survey from Pangany to Fuga, our remarks upon the coast, and an account of our expedition up to date.

On the 5th January, 1857, I intimated to you our intention of visiting the East African mainland. The death of the Imám of Muskat, H. H. Saggid Said, the undecided succession, and the troubled state of the interior, then suffering from famine, war, and drought, rendered a preparatory excursion advisable. We could obtain no useful information from the European merchants of Zanzibar, who are mostly ignorant of everything beyond the island. The Arabs and Sawahilis, who were adverse to, and fearful of, white travellers, *did* give us information, but it was worse than none. We had not heard from the Rev. Mr. Rebmann, who still remained at the Mission-house near Mombás; and, finally, it was judged expedient to be seasoned by fever on the coast before attempting the far Unyamesi Lake.

Arrived at Mombás, we visited Mr. Rebmann, who had not received the communication of the Church Missionary Society. The rev. gentleman is now at Zanzibar.

I received from Mr. Henry L. Anderson, the Political Secretary to Government at Bombay, a copy of a letter from the Medical Board of Bombay recommending that Assistant-Surgeon Steinhausen, B.A., for whose services I had applied, should be furnished with such medicines and surgical instruments as he might consider necessary. Farther, that to assist in the advancement of scientific research, meteorological instruments may be obtained from the medical stores at Bombay, and placed at his disposal.

Under the same inclosure was transmitted for my information copy of a letter from Mr. George Buist, Secretary to the Bombay Geographical Society, dated 8th December, 1856, conveying certain useful suggestions with respect to the expedition. I am about to supply the Bombay Geographical Society with a few geological specimens and an account of copal-digging in these regions, in consequence of Mr. Secretary Anderson's letter, and hope that the Royal Geographical Society will approve of the step. I am grateful for this supply of extra instruments.

Returning to Pangany on the 21st February, we lost no time in catching the fever, as Capt. Speke, my Portuguese servant, and I, were attacked by the disorder—a severe bilious remittent—on the same day. My companions were comparatively fortunate; the fever stuck to me for a week, and left me in the condition of a bed-ridden old woman. Under these circumstances it was judged advisable to postpone the remainder of our coasting voyage, and to seek medical aid at Zanzibar without delay. We arrived here on the 6th March, and were received with his usual kindness and hospitality by Col. Hamerton. We are both recovering by degrees from the consequences of fever, and hope soon to be duly seasoned for travel into the interior. The rainy season and the s.w. monsoon have just set in, and we shall therefore be confined to the island for some time. We are now engaged in providing ourselves with an outfit, which, for economy, must be purchased before the season opens, in applying to the Prince for an escort, and in making ready the hundred *impediments* which belong to African travel.

It appears that during the present year Southern and Eastern Africa will be penetrated in various directions. At Zanzibar I lately met M. Gabriello de Rivalta, a Capucin of the Lyons French mission, who is proceeding to his head-quarters—the hitherto inaccessible Kaffa. M. Guglielmo Massaja, the "Vicario Apostolico dei Gallas," has made that province his residence, and two other priests are living at Gudru and Enacia. Father M. Gabriello has lately

been informed from Rome that four or five other missionaries are sent to aid in the great labours reported by the Vicar-General. Nearly 400,000 Gallas have, it is said, embraced Christianity, and conversions by thousands still take place. Unable to penetrate Africa, viâ Masawwah, on account of the Abyssinian heretics, the rev. gentleman has resolved to travel alone and unarmed, viâ Makdisha (Magado) and Gananah, through the Gallas. The experiment will be most interesting.

At the Cape, an expedition has been proposed on a plan recommended by the lamented Swedish naturalist, Professor Wahlberg. Several waggons, starting simultaneously, after penetrating to a certain point northward, will separate and explore eastward and westward. At a time and place previously agreed upon, they are to meet and confer upon the propriety of continuing their journey. Nothing appears more feasible than such a project; and, indeed, it is probable that Africa can be penetrated with less fatigue and risk of disease from the Cape than from any other point.

An American expedition is also expected at Zanzibar. Some years ago Major Cothcal (*sic*), of New York, visited this coast in his own vessel, with the intention of exploring the interior. Like all others who have attempted the discovery, he failed to detect the embouchure of the Juba or Govind river, but he observed a discolouration of the sea, which has given rise to the hope of finding this mysterious outlet. It is said that the party will be composed of men accustomed to endure fatigue and to face danger, accompanied by free blacks from America, with natives of the country as guides and porters; and that no great scientific researches will be attempted from a fear of rendering the undertaking futile. This manner of exploration, which finds little favour in the eyes of the Royal Geographical Society, is eminently fitted to open a way for philosophic geographers through dangerous regions.

I have the honour to request the attention of the Council of the Society to the remarks upon the subject of maps contained in the accompanying Report. Nothing can be more erroneous, in commission and omission, than Capt. Owen's Chart of the Coast (No. X.) from Chala Point to the Pangany River. That officer himself declared that the sickness on board his ships interfered with the surveying north of Mombás; he seems not to have landed at Makdishu, or to have sought the mouth of the Yuba River. Even southward, many important places are unnoticed. The curious inlet called Tanchi, situated about 9° 55′ s., a little above the embouchure of the Lindy, does not appear upon his chart. This, some years ago, was a nest of slavers, who shared their secret, it is said, with certain Zanzibar

merchants. They frequented the place till unpleasantly disturbed by H. M. S. Grecian. In making these remarks, I would by no means detract from the merit of an officer whose name has ever been mentioned with honour. But in those days a survey had but few facilities, pilots caused perpetual complaints, there had been no preparatory exploration, and interpreters could deceive as they pleased. The native names in the charts are full of blunders. Equally full of extraordinary mistakes in the maritime part are other maps, and, in fact, the only tolerable delineation of the coast from Mombás to Pangany is the Rev. Mr. Erhardt's rude sketch map, lithographed in 1850 in London.

The accounts formerly made in Europe about the facility of penetrating inland from Kilwa (Quiloa) and the economy of travel in that region are fabulous. The southern Sawahili are more hostile to explorers than the inhabitants of the northern maritime towns, and their distance from the seat of government renders them daring by impunity. But last year they persuaded the Wagindo tribe of the interior to murder a peaceful Arab merchant, in order that strangers might be deterred from interfering with their commerce. Messrs. Krapff and Erhardt, of the Mombás mission, spent a few hours at Kilwa, where they were civilly received by the Governor and citizens, but were sadly deceived in being led to imagine that they could make that part their starting-point. Lieut. Christopher, I.N., who visited the coast about the year 1843, in the H.E.I.C. brig Tigris, more wisely advises the neighbourhood of Kilwa to be avoided.

We shall probably land at Bagamoyo: as yet, however, this point cannot be determined. I scarcely anticipate being able to set out before the middle of June proximo, as the Moslim fast-month intervenes. This is a loss of time, but I will endeavour to utilize my residence upon the island by drawing up a description of it and an ethnographical account of the slave races on the neighbouring mainland.

On the 24th of March, 1857, I received from the Secretary to Government, Bombay, an official letter, transmitting a copy of a communication from the Secretary to Government of Bengal (No. 170, of 3rd of January, 1857), according permission to Captain Speke, and Assistant-Surgeon Steinhausen, B.A., surgeon, Aden, to accompany the expedition on the pay and allowances of their rank. I cannot but express the warmest gratitude to his Excellency Lord Elphinstone, to the Honourable Mr. Lumsden, and to other members of the local Government, who have added to a long list of former favours by providing me with these stanch and valued companions.

The virgin ground of Eastern Africa is a field far too extensive for a single observer. The climate of the sea-board does not yield in fatality to that of the western coast, and the jealousy of Arabs and Sawahilis may assume a more virulent form in the interior. Under these circumstances, the presence of an able surgeon and two tried men is by no means to be despised. Dr. Steinhausen has not joined us yet, but we still indulge hopes that he may be on his way.

Trusting that the Royal Geographical Society will approve of our past proceedings and of our future plans, I have the honour to subscribe myself, Sir,

Your most obedient servant,

RICHARD F. BURTON.

To Dr. Norton Shaw, Secretary to the Royal Geographical Society.

The PRESIDENT then read the following extract of a letter from Zanzibar, dated July 11th, 1857.

"This day three weeks (June 16th) Colonel Hamerton sailed with the Captains Burton and Speke for Bagamoyo, to lend his personal influence on the very spot from which they were to start. Though much was still to be settled, no difficulties were experienced, and after ten days (June 26th) the Captains, accompanied by a body of upwards of 200 men (150 of whom were armed), set out on their enterprising journey.

"Four days after their departure a note from Captain Burton was received, saying that all was going on favourably. Every evening a cannon was fired from the ship to put the next heathen tribe, from whom alone some resistance was suspected to be made, in awe of the passing caravan."

The PRESIDENT.—In returning our thanks to Captain Burton for his communication, I must say that the earlier part of it gives a compendious and clear account of that portion of the coast of Africa which he has passed along. The remainder of the paper is made up of a great deal of information obtained from various travellers on the coast. As there are distinguished African travellers in the room, I hope we may hear observations from them on this memoir.

Dr. BARTH.—It is my opinion that the account given by Mr. Rebmann and the Rev. Mr. Krapff of the Snow Mountains is not based on fact. It would be desirable that the report made by Captain Short, who ascended the river Juba, and who also, at a point farther to the north, supposed that he saw snowy mountains, should be published with all the details, that it might be seen on what facts this opinion is based, that these mountains are covered with snow. I suppose these mountains can in no way be so high as to reach the line where eternal snow can be preserved the whole length of the year, nevertheless I think that in the direction from the equator towards Kaffa there might be mountains to the elevation of 15,000 or 16,000 feet, which at certain seasons of the year, and in peculiar localities, might be covered with

snow. But it is my decided opinion that all the rivers of Central Africa, which take their course in various directions from the equatorial region, are fed exclusively by the enormous quantity of rain which falls during the rainy season, and not by snow which might be preserved on high peaks of mountains. If Captain Burton should succeed in penetrating farther into the interior, we shall certainly soon hear whether there are mountains of such great elevation as to reach the height of 15,000 or 16,000 feet. At present I think we may suppose that Mr. Rebmann was in error when he believed he saw before him mountains covered with snow, which might have been a crust of white rock such as Dr. Livingstone saw farther to the south.

Dr. LIVINGSTONE, F.R.G.S.:—I know very little about that part of the country, and that little was obtained in the same way that Captain Burton got his. It may, however, be of some importance that I derived my information from a point opposite to that where the missionaries on the coast and Captain Burton had theirs. I met some Arabs from Zanzibar, in the middle of the continent, and about 15 south latitude. They pointed out a large lake to the north-east, and volunteered to take me with them on their way back to Zanzibar. They stated that when they went to Zanzibar they could either cross the southern end of that lake, or go round it. When they could get canoes it took them three days to get across, and they punted their canoes the whole way. They slept upon islands. If we take 15 or 20 miles as a good day's journey, the lake might be 50 or 60 miles across. It appears to be quite shallow. One of the Arabs used an expression which I never could understand; it was "we have 'maero'" on that lake.* This is probably an Arab word, and perhaps some of those who understand Arabic can tell what it means. There can be little doubt but that there is, as stated, a large shallow collection of water in the interior. Now the nature of the country seems to give an explanation of the mode in which this lake is formed. We have an elevated level partition in the oblong valley, in the middle of the country, so level in many parts I crossed that the water stands upon it for months together. We found the lotus plant growing in the water. When you look at these plains they seem extensive prairie land covered with grass, and amongst the grass we have the lotus flower. We saw likewise fishes that have come out of the river, and the runs of others. From this elevated partition the water, in part, flows away to the north and forms the Congo, and some goes to the south and forms the Zambesi. All the country to the east of that where I was, is of the same character—an elevated level plateau. We have two rainy seasons in the course of each year. An immense amount of water falls, and that water stands for a long time. It seems to me that nearly all the rivers in that part arise, not from fountains, but from bogs fed by percolation from the plains. A great many that I crossed had a bog on each side of them. The water seems to soak into these level plains and then ooze out through the bogs into the rivers. Probably a branch of the Zambesi rises in the vicinity of that lake. It would seem to be simply a shallow collection of water, dependent very much upon the rains, which fall in great abundance in that region. If Captain Burton gets in, as I hope he may, through the coast tribes, there can be little doubt but that he will find his way to the lake. I scarcely apprehend that it is so large as represented in the map. I went as far to the east as the 22nd degree of longitude, and it begins in the 25th. I think I must have heard of it. I was in 24° in the south, and in the north in 20° and 21°, and I got information of the country to the east of where I was travelling, but no information about this immense sea. I may state that the people in the middle of the country have all heard of the sea. They call it 'metse a hula,'

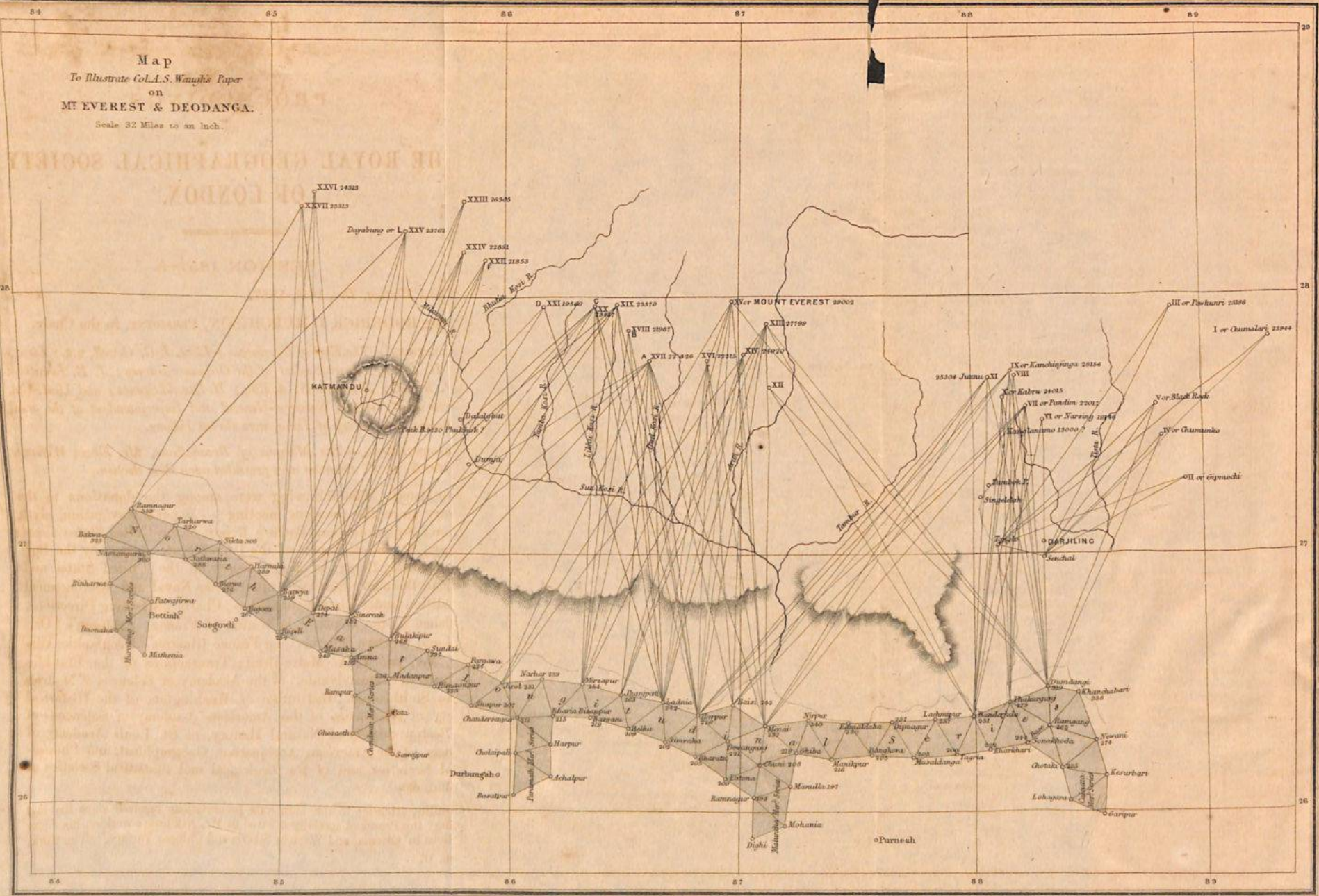
* The Arabic word was stated by Sir H. Rawlinson to mean, the water stands, or does not flow, *i. e.* is stagnant.

which means the water that grazes. When the tide rises they imagine that it is the sea coming into the land to graze; and they say to each other they must be on the look out lest the sea should come in and eat them up. Now they say nothing at all about an immense sea in the middle of the country, so I imagine it cannot be so large as represented. But it seems to be a considerable collection of water notwithstanding. Captain Burton will, I hope, settle the matter. It is scarcely worth while to speculate now when he is on the spot, for one observation is worth a waggon load of speculations. With reference to these coast tribes a question comes before us now of some interest, and that is, the revival of a species of slave-trade by the French and Spaniards on the west coast. Some have stated that it is the normal state of the Africans to be stealing each other, and buying and selling each other. I can scarcely think so. There is as much truth in that as if it were stated that the normal state of English and Scotch banks was—to break. The people on the coast get guns and gunpowder, and where they find they can pay for these things by a foray upon the inhabitants in the interior, why they have a strong temptation to go and make that foray. But it is by no means the normal state of the people in the interior. The only cause of war that ever I heard of, previous to the introduction of the slave-trade, was for cattle. They usually have some old feud, such as some of our forefathers had in Scotland; they say, "the cows that we now capture are just the calves of the calves of the cows that were lifted by the enemy's tribe some twenty years before." So again, they say, "Why they have just been keeping them for us all this time, and we go to bring them back." So that it is scarcely possible to know who are the original owners of the cattle. Some tribes have actually refrained from keeping cattle altogether, on account of the wars in which the practice involved them. They say that cattle bring war, we will not keep them: they do not talk of the slaves bringing war, because they have no slaves in the interior. As to going to the coast to give payment for captives, to be called emigrants, I believe the Africans would emigrate if they knew where they were going to, and that they would come back after a number of years with property, as the Coolies can return from the Mauritius. But who can convince them that when they go across the sea—a sea of which they know almost nothing—that there they will find men in whom they can have confidence, and who will be faithful to them? It is impossible. You cannot produce that impression in the African mind. On that account, I say, it would be much better to go to Africa, where we have free labour on the spot, than be at all the bother of stealing them and carrying them to other countries. It may be said that we have fine colonies, that the West India Islands is a fine country, capable of producing any amount of sugar and other products that we need. But have the planters in the West Indies the money to pay for the labour? That is the important question. From what I hear—and I may not be well informed—the call for labour simply means a call for money. If, instead of supplying them with labour, for which they cannot pay, we supplied them with an Encumbered Estates Act, it might be beneficial to them. The small island of Mauritius has free labour, and it produces sugar equal to one-fourth the entire consumption of Great Britain. Now this small island is only 25 miles long. I think the most important part of the discoveries I was privileged to make is, that there is an immense extent of country where sugar and cotton might be cultivated. And, if people will only pay for labour, there they have it on the spot. You must not suppose that the African will work if you do not pay him for it.

Map

To Illustrate Col. A.S. Waugh's Paper
on
Mt. EVEREST & DEODANGA.

Scale 32 Miles to an Inch.



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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1857–8.

Third Meeting, Dec. 14th, 1857.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

ELECTIONS.—*The Earl of Carnarvon; Lieut. J. C. Cowell, R.E.; Lieut.-Col. H. James, Superintendent of the Ordnance Survey; J. B. Johnston; F. P. Keysell; Alderman W. A. Rose; H. Donald Spence; and Lieut.-Col. Andrew Scott Waugh, Surveyor-General and Superintendent of the great Trigonometrical Survey of India, were elected Fellows.*

PRESENTATIONS.—*The Marquis of Breadalbane, Mr. Edwin Williams, and Mr. G. B. C. Leverson were presented upon their election.*

DONATIONS.—The following were among the donations to the Library since the previous meeting:—Raper's Navigation, sixth edition; Superintendent Bache's Report of the United States' Coast Survey; Statistical Report of the United States Army, by the Surgeon-General; Report of Major Emory on the United States and Mexican Boundary Survey; United States Naval and Astronomical Expedition under Lieutenant Gilliss; Charts and Sailing Directions, published by the Dépôt de la Marine of France; Atkinson's 'Oriental and Western Siberia;' La France Illustrée—Géographie, Histoire, &c., par V. A. Malte-Brun; Transactions of the Franklin Institute of Pennsylvania, of the Academy of Sciences of Madrid, of the Smithsonian Institution of Washington, of the Historical Society of Wisconsin, of the American Academy of Sciences, of the Boston Society of Natural History, of St. Louis Academy of Sciences, of the American Antiquarian, Geographical, and Philosophical Societies, and of the Zoological and Statistical Societies of London, &c.

In calling attention to the numerous presentations received since the last meeting, the President specially referred to Mr. Atkinson's work on his 'Explorations in Oriental and Western Siberia and Chinese Tartary.' The work,

he added, did the highest honour to the individual who accomplished such laborious and hazardous journeys, and had made us familiar, through his artistic skill, with vast mountainous regions of the earth which had been trodden by few civilised men. He strongly commended this work to the favourable consideration of the Fellows.

ANNOUNCEMENTS.—The Chairman announced that, respecting the reported discovery of a large fresh-water lake in South Australia by Mr. Goyder, an account of which had been read at a previous meeting, Captain Freeling, the Surveyor-General, had just returned from the exploration of the so-called grassy, well-watered district, which he found to be almost entirely imaginary, and that the flood waters had disappeared. Lake Torrens was again a shoal salt lake, with immense borders of mud. After the most persevering efforts it was found impossible to launch the boat taken up by Captain Freeling. The country near the lake was also found to be of the most desolate character, exactly as our geographers Eyre, Sturt, and Frome had described it.

The papers read were:—

1. *The Exploration of Arid Countries.* By FRANCIS GALTON, Esq., M.A., Honorary Secretary.

THERE is no comparison between the difficulty of first exploring a desert land and that of travelling across it when its oases have been discovered. Besides the difficulties of a new road and the necessity of travelling during the heat of daylight, all first explorers labour under a peculiar and overwhelming difficulty in having the fear of a double journey perpetually before their eyes. They can never venture so far from camp as to preclude the possibility of being able to return to it without a fresh supply of water, and the extreme limit of their excursions, into the heart of the desert, is reduced to one-half of that which they (or other travellers after them) could have accomplished, if they had been assured of a watering place at the close of their journey. Again, as the *radius* of their excursions is only one-half of the length available, it follows that the *area* of their explorations may be only one-fourth as much, and, therefore, that their chance of finding an oasis, useful to others, is in that proportion less than what it would be if they became possessed of means of travelling farther. And, finally, even this limited field of exploration can only be attempted by persons who are able to endure great personal hardship, and who do not shrink from the certainty of exhausting their cattle, and the great risk of killing some of them, in each fruitless expedition. Exceptional cases doubtless occur; indeed, if it were not for these, the longer

caravan routes could never have been discovered, but, speaking generally, the difficulties of an explorer are such as I have described them to be, and any unknown fringe of desert which happens to contain no sure watering place within a circuit of a day and a half or a two days' journey will check the progress of travellers and settlers for many years.

It would therefore be a real advantage to persons who found themselves at the borders of unknown regions in arid countries, whether they were cattle owners straitened for fresh pasture land, or miners seeking for new fields of mineral wealth, as well as to leaders of expeditions who found themselves stopped by drought, if any satisfactory method could be devised by means of which the radius of exploratory trips might be largely increased, and the object of the present paper is to show that it is really feasible to devise such a scheme, and that by its aid the desert may be explored to distances fully as great as any cattle could be driven, and, lastly, that these distant explorations may readily be carried on without the sacrifice of a single meal.

I suppose an "*exploring*" party, as few in number as is consistent with efficiency, to be aided by a "*supporting*" party, who may be divided into two or more sections. The duty of this supporting party is to carry provisions, partly to be eaten on the way out, and partly to be "*cached*," or buried in the ground, in order to supply the wants of the homeward journey. After a certain distance from camp had been reached, and the loads of one "*section*" of the supporting party had become exhausted in furnishing meals and câches to the entire expedition, this section would separate from its companions and return home. A second "section" would subsequently act as the first had done, and afterwards a third, and even a fourth, according to their original number. Finally, the explorers would be left by themselves at some days' journey in advance of the farthest known watering place, with their own loads of provisions untouched, and with other provisions, stored in câches, fully sufficient for their return, and in every respect as capable of farther exploration as if it was from their own camp, and not from a spot in the heart of the desert, whence they were about to take their departure.

Doubtless the same general idea must often have occurred to other travellers besides myself; but whether it is because the details have been found puzzling and difficult to work out, or because the necessary vessels for carrying water were not to be met with when wanted, no traveller in arid countries has ever availed himself of the great power which this method of exploration affords.

Number of Rations that can be carried.—The following Table (1) affords, I believe, as fair an approximation as the nature of the case admits of, to the weight of rations consumed by men and cattle in an arid climate, and to the weights they are severally able to transport across a broken and a pathless country. It must be recollected that the weight carried is a diminishing one:—

TABLE 1.

	Full Rations.		Shorter Allowance.		Net Weight Transportable.	
	Water.*	Food.	Water.	Food.	On Wheels.	On Back.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Horse or mule ..	45	20	30	20	250—350	130—180
Ox	60	20	40	20	250—350	110—150
Man	10	3	..	..	..	15—25

Table 2 is deduced from Table 1. It shows how many days' rations can be transported under various circumstances. H stands for one horse; M for one man: thus the first line signifies that a horse can transport on wheels $3\frac{1}{2}$ days' rations of food as well as of water for himself and one man; the joint weight of these rations being 273 lbs.:—

TABLE 2.

	Number of Day Rations.	Food and Water for Horse and Man.	Number of Day Rations.	Water for Horse, Food and Water for Man.	
		lbs.		lbs.	
Horse or Mule. On wheels	$3\frac{1}{2}$	H + m = 273	$5\frac{1}{2}$	H + m = 318	Full rations.
Horse or Mule. On wheels	$3\frac{1}{2}$	H + 2 m = 266	$5\frac{1}{2}$	H + m = 236	Short rations.
Horse or Mule. On back	$1\frac{1}{2}$	H + 2 m = 137	$3\frac{1}{2}$	H + = 157	Full rations.
Horse or Mule. On back	$1\frac{1}{2}$	H + 4 m = 141	$3\frac{1}{2}$	H + m = 144	Short rations.
Man, on back ..	$1\frac{1}{2}$	M = 20	..	..	Full rations.

The general result is that a man can carry $1\frac{1}{2}$ day's rations, and that a horse can transport, according to circumstances, $1\frac{1}{2}$, $3\frac{1}{2}$, or $5\frac{1}{2}$ days' rations for himself, and for one man at least.

It is necessary to determine how many meals shall be allowed per day, in order that when a "section" of the supporting party turn back, they may do so after one of their regular meals; for it would be absurd to require that they should turn back at the end of some quaint fractional part of a day's journey after they had been supposed to have eaten a corresponding fraction of a day's

* A large bucket, full to the brim, holds 3 imperial gallons, or 30 lbs. weight of water. My full rations for a horse are two large buckets a day, each of them as nearly full of water as those given to horses usually are.

rations, and we must make our selection between a division of the day's rations into one, two, or three meals. In the steady equable travel which I have in view, I entertain no doubt that the best economy of strength and food, both in man and beast, is to be obtained by assigning them two journeys and two meals a day—a morning and an afternoon journey, and a noon and an evening meal. This, then, will be the arrangement I shall lay most stress upon.

Size of the "Sections."—The number of men that turn back would naturally bear in each case a constant ratio to the numbers that go on. If, for example, the exploring party consist of 10 men, and the detachment that last left them consisted of 10 men also, this same proportion would hold from first to last throughout the journey; that is to say, whenever a detachment broke off, the number of men that returned in it would exactly equal the number of those who continued to advance. Theoretically speaking, any proportion whatever might be adopted, but it so happens that the one I have taken as an example, half going back and half going on, is the one that is likely to be the most generally useful; for it is very simple and easy to be remembered, very generally applicable, and one of the most economical as regards work done and numbers employed. In this paper I shall give most space to its description, and simply indicate other cases which might be serviceable by drawing attention to the General Table, No. 4. To this I must again refer. At present, recurring to our *binary* system, if the exploring party consists of a number of men equal to *e*, the following Table (3) shows what must be the constitution and size of its supporting party, according to the number of "sections" intended to be employed in it:—

TABLE 3.—BINARY SYSTEM.

	At end of last Stage.	At end of last but one.	Of last but two.	Of last but three.	Of last but four.	&c.
Total number of Advance party ..	e	$2e$	$4e$	$8e$	$16e$	&c.
Exploring party	e	e	e	e	e	
Supporting party:—						
Latest detachment	..	e	e	e	e	
Last but one	..	..	$2e$	$2e$	$2e$	
Last but two	..	..	..	$4e$	$4e$	
Last but three	..	..	..	..	$8e$	
&c.	&c.					

Length of Stages and Loads carried.—The Table (4) (see page 64), so far as it extends, shows every case in which there can be an exact adjustment of loads, meals, and subdivisions of the party. It

TABLE 4.

GENERAL TABLE, showing the number of Day Rations that must be carried by each Individual under various conditions of—1st, *Numbers and Constitution of the Party*; 2ndly, *Number of Meals per Day*; 3rdly, *Length of each Stage*,—in order to ensure an exact adjustment between the Food taken and the Food wanted.

		Accurate.	Accurate.	Accurate.	Accurate.	Approximate.	Accurate.	Approximate.	Accurate.	Approximate.	Accurate.	Approximate.	Accurate.	Approximate.	Accurate.	Approximate.	&c.	
Number and constitution of the party.	Explorers	1	1	1	16	4	81	9	81	3	16	2	64	5	81	7	256	4	&c.	
	Last Section	1	2	3	8	2	27	3	54	2	24	3	48	4	108	9	64	1	,,	
	Last but one	2	9	12	12	3	36	4	90	3	60	7	84	7	252	21	80	1	,,	
	Last but two	4	18	48	18	4	48	5	155	6	150	19	147	12	588	49	100	2	,,	
	Last but three &c. &c.	8	54	192	27	7	64	7	250	9	375	48	..	21	1372	114	125	2	,,	
		&c.																		
Ratio between	Those who go on	1	1	1	2		3		3		2		4		3		4		&c.	
	,, who go back	1	2	3	1		1		2		3		3		4		1		&c.	
	Length of each Stage.																			
Day Rations served out in 1 Meal.	1 day journey	3	2	$1\frac{2}{3}$	5		7		4		$2\frac{1}{3}$		$3\frac{2}{3}$		$2\frac{1}{3}$		9		&c.	No. of Day Rations carried by each individual.
	2 ,, ,,	7	5	$4\frac{1}{3}$	11		15		9		$5\frac{2}{3}$		$8\frac{1}{3}$		6		19		,,	
	3 ,, ,,	11	8	7	17		23		14		9		13		$9\frac{1}{2}$		29		,,	
	&c. &c.	&c.																		
Differences . .	1 ,, ,,	4	3	$2\frac{2}{3}$	6		8		5		$3\frac{1}{3}$		$4\frac{2}{3}$		$3\frac{1}{2}$		10		&c.	
Day Rations served out in 2 Meals.	$\frac{1}{2}$ day journey	$1\frac{1}{2}$	1	$\frac{5}{6}$	$2\frac{1}{2}$		$3\frac{1}{2}$		2		$1\frac{1}{6}$		$1\frac{5}{6}$		$1\frac{1}{4}$		$4\frac{1}{2}$		&c.	No. of Day Rations carried by each individual.
	1 ,, ,,	$3\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{6}$	$5\frac{1}{2}$		$7\frac{1}{2}$		5		$2\frac{5}{6}$		$4\frac{5}{6}$		3		$9\frac{1}{2}$		,,	
	$1\frac{1}{2}$,, ,,	$5\frac{1}{2}$	4	$3\frac{5}{6}$	$8\frac{1}{2}$		$11\frac{1}{2}$		7		$4\frac{2}{3}$		$6\frac{2}{3}$		$4\frac{3}{4}$		$14\frac{1}{2}$		,,	
	2 ,, ,,	$7\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{2}{3}$	$11\frac{1}{2}$		$15\frac{1}{2}$		$9\frac{1}{2}$		$6\frac{1}{6}$		$8\frac{5}{6}$		7		$19\frac{1}{2}$		,,	
	&c. &c.	&c.																		
Differences . .	$\frac{1}{2}$,, ,,	2	$1\frac{1}{2}$	$1\frac{1}{3}$	$3\frac{1}{2}$		4		$2\frac{1}{2}$		$1\frac{1}{6}$		$2\frac{5}{6}$		$1\frac{3}{4}$		5		&c.	
Day Rations served out in 3 Meals.	$\frac{1}{3}$ day journey	1	$\frac{2}{3}$	$\frac{5}{9}$	$1\frac{2}{3}$		$2\frac{1}{3}$		$1\frac{1}{3}$		$\frac{7}{9}$		$1\frac{2}{9}$		$\frac{5}{6}$		3		&c.	No. of Day Rations carried by each individual.
	$\frac{2}{3}$,, ,,	$2\frac{1}{3}$	$1\frac{1}{3}$	$1\frac{1}{9}$	$3\frac{1}{3}$		5		3		$1\frac{5}{9}$		$2\frac{7}{9}$		2		$6\frac{1}{3}$		,,	
	1 ,, ,,	$3\frac{2}{3}$	$2\frac{1}{3}$	$2\frac{2}{9}$	$5\frac{1}{3}$		$7\frac{1}{3}$		$4\frac{2}{3}$		3		$4\frac{2}{9}$		$3\frac{1}{6}$		$9\frac{2}{3}$		,,	
	$1\frac{1}{3}$,, ,,	5	$3\frac{1}{3}$	$3\frac{1}{9}$	$7\frac{1}{3}$		$10\frac{1}{3}$		$6\frac{1}{3}$		$4\frac{1}{9}$		$5\frac{8}{9}$		$4\frac{1}{6}$		13		,,	
	$1\frac{2}{3}$,, ,,	$6\frac{1}{3}$	$4\frac{1}{3}$	$4\frac{4}{9}$	$9\frac{1}{3}$		13		8		$5\frac{7}{9}$		$7\frac{1}{9}$		$5\frac{1}{6}$		$16\frac{1}{3}$		,,	
	&c. &c.	&c.																		
Differences . .	$\frac{1}{3}$,, ,,	$1\frac{1}{3}$	1	$\frac{8}{9}$	$2\frac{2}{3}$		$2\frac{2}{3}$		$1\frac{1}{3}$		$1\frac{1}{9}$		$1\frac{5}{9}$		$1\frac{1}{6}$		$3\frac{1}{3}$		&c.	

is drawn up under the several conditions of one, two, or three meals being issued per day, and the details of any particular set of cases can, at once, be deduced from it.

The "*differences*" supply ready means for continuing the columns, and, if it be desired to extend the table, or to work out any question relating to the subject of it, it is easy to do so by employing the following formulæ. Let a = the number of the exploring party; b = those of the section that turns back last; s = those of the section that turns back first; m = total number of individuals (horses or men, as the case may be) employed in the expedition; l = load of day rations carried by each of them; n = number of meals into which the day ration is divided; d = distance to which the explorers are to be forwarded; r = number of stages into which d is divided; g = length of each of them reckoned in day's journey. Then, we have—

(1.) $$\frac{a}{b} = \frac{ln - 2gn + 1.}{2gn.}$$

(2.) $$m = \frac{(a+b)^r}{a^{r-1}}$$

(3.) $$s = \frac{(a+b)^r}{(a+b)^{r-1}} - \frac{(a+b)^{r-1}}{(a+b)^{r-2}}$$

(4.) $$r = \frac{d}{g}$$

(5.) The additional distance that can be travelled by a, after the last section has turned back, $= \frac{ln+1}{2n}$; if this is not integral, the integer next less than it must be adopted.

In the equation (2), if $a = 1$, and if b is an integer, then m is necessarily an integer also; but if a be greater than 1, and if $\frac{a}{b}$ be a fraction reduced to its lowest denomination, m cannot be integral, unless both it and all the terms of the series $a, b, \ldots s$, be multiplied by a^{r-1}. This has been done in the headings of the fourth and subsequent columns of Table 4, and shows the cumbrous series of terms that become necessary when $\frac{a}{b}$ is other than a very simple fraction. An accurate adjustment of loads taken and of food wanted is not, however, essential, and I have therefore appended an approximative series of terms of more manageable size, and which would serve well enough, in actual practice, in cases where each man's rations were not kept separate from those of his colleagues.

Table 5: it shows the precise method according to which the

meals are dispensed in the three most useful cases of the "binary system," which are those contained in the first column of Table 4.

TABLE 5.—DISTRIBUTION OF MEALS.

Binary arrangement of Party and one Section only employed.

Distance in Day's Journey.	3 Meals, or 1¼ Day Rations. CAMP.	7 Meals, or 3½ Day Rations. CAMP.	11 Meals, or 5½ Day Rations. CAMP.	
½	● ● ●	● ● ● ●	● ● ● ●	Loads of the respective Supporting parties.
1	● ●	● ● ●	● ● ● ●	
1½	●	● ●	● ● ●	
2		● ●	● ●	Loads of the respective Exploring parties.
2½		● ●	● ●	
3		●	● ●	
3½			● ●	
4			● ●	
4½			●	

The importance of adhering strictly to the determinations of Table 4 is very great: thus, to take a case under the "binary system," it shows that if a supporting party starts carrying more than 1½ and less than 3½ days' rations per man, they can give no greater assistance than if they carried 1½ day's rations only. But, again, by looking over the Table, we find if the travellers adopted a system, such as is shown in the sixth column, that their powers of carrying 2 days' rations per head, would be utilised to the utmost, and so on in any other of the vast number of cases which might be proposed for solution. It must be recollected that a waste, which may be of little importance when the supporting party consists of one section only, becomes multiplied over and over again, and increased enormously, when many sections are employed. Again, though the Table shows the load which must be carried to meet the requirements of each case, it does not follow that we need adhere strictly to them, but, for instance, a load of 3 meals may be taken as a nominal 2⅝ths, or a load of 6 meals as a nominal 6½th, and the traveller feasted or fasted, as the case may be, in proportion.

Ratio between { those who go on / „ who go back }	1/1	1/2	1/3	2/1	3/1	3/2	2/3	4/3	3/4	4/1	&c.
1 meal	3 { 4 men. 2 days. 2 stages.	2 { 9 men. 2 days. 2 stages.					$2\frac{1}{3}$ { $\frac{12}{2}$=6 men. 2 days. 2 stages.		$2\frac{1}{2}$ { $\frac{35}{7}$=5 men. 2 days. 2 stages.		
2 meals		$2\frac{1}{2}$ { 9 men. 2 days. 2 stages.	$2\frac{1}{6}$ { 13 men. 2 days. 2 stages. *	$2\frac{1}{2}$ { $\frac{20}{4}$=5 men. 2 days. 6 stages.		2 { $\frac{23}{3}$=8 men. 2 days. 4 stages.	$2\frac{5}{6}$ { $\frac{12}{2}$=6 men. 2 days. 2 stages.		3 { $\frac{35}{7}$=5 men. 2 days. 2 stages.		
3 meals	$2\frac{1}{3}$ { 8 men. 2 days. 2 stages.	$2\frac{2}{3}$ { 9 men. 2 days. 2 stages. *	$2\frac{5}{9}$ { 16 men. 2 days. 2 stages. *		$2\frac{1}{3}$ { men. 2 days. 6 stages. *	3 { $\frac{14}{3}$=5 men. 2 days. 3 stages.	3 { $\frac{12}{2}$=6 men. 2 days. 2 stages. *	$2\frac{7}{9}$ { $\frac{29}{3}$=6 men. 2 days. 3 stages.	2 { $\frac{86}{7}$=12 men. 2 days. 3 stages.	1 { men. 2 days. 6 stages. *	

A traveller, wishing to make use of Table 4, must first ascertain the number of day-rations that each member of his party can transport, and then he must extract from the Table every case that corresponds with this number; out of these he will have to select the one that best meets his particular wants. To take an example, we will suppose that each of his men can carry between 2 and 3 day-rations; he will then have to copy out, as is done below, every entry in the body of the Table 4 that falls between 2 and 3. In order to compare each of these with the rest, he should roughly determine upon the distance to which he wishes to transport his exploring party—we have supposed it to be 2 days' journey out from camp. He will then write out, by the side of each of his previous entries,—1st, the number of men (including the explorers themselves) that would be required at starting in order to accomplish this journey; 2ndly, the exact distance to which the explorers will be conveyed and provisioned by the supporting party; and 3rdly, the number of stages, or, what comes to the same thing, of sections, that must be employed. In cases where the number of the exploring party, as shown in the headings to the columns of Table 4, is other than 1, the only easy way of making a comparison between the number of men required in them and in the rest is to enter them under a fractional form as $\frac{5}{1} = 5$ men. Having done this, the cases that are obviously of little use must be scored out—I have marked them with an asterisk (*)—and then a careful comparison of the rest will show the one that is the most suitable for the special requirements of the particular case. Thus the question of weight may or may not be more important than that of numbers; a single meal per day may not be objectionable, or else the heat and drought may be such that men will not work well with less than three meals; it may be essential, as a point of discipline, to keep the rations of water separate; there may not be enough trustworthy men to allow of a subdivision of the supporting party into many sections;—and so forth.

Principle of "Repetition."—Diagram No. 6 (p. 69) offers an illustration of a supporting party composed of three sections, whose numbers are respectively e, $2e$, and $4e$; the dark lines represent the outward routes, and the dotted lines the homeward ones; but by it we may also see that precisely the same effect is producible by "*repetition*" as by *numbers*. It is clearly a matter of indifference whether two men, whom we will call M and N, start from camp simultaneously, M turning back at the end of a stage and N going on, or whether a single man perform the duties of M and N consecutively, and it is quite possible that a single man might go through the whole scheme

DIAGRAM 6.

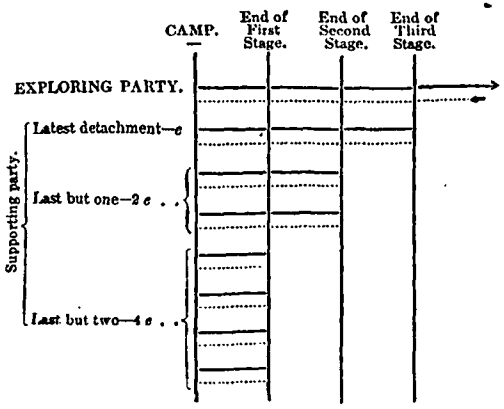
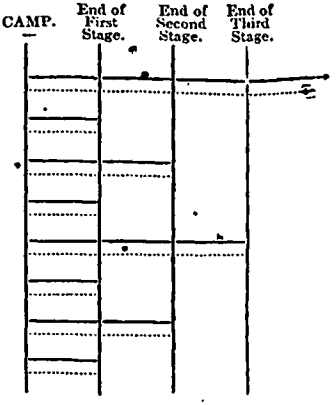


DIAGRAM 7.



of diagram (4), beginning at the lower end and ending at the upper. In his four trips to the end of the first stage, he would have transported and deposited in câche exactly as much as four men could have done who travelled simultaneously, and so on throughout his whole career. He, of course, would lose in time the exact equivalent of what he gained in diminution of numbers; and thus, since the above diagram represents 4 *e* as being occupied for two stages (one out and one back), 2 *e* during four stages, and 1 *e* during six, in carrying on the work of the supporting party, it follows that, if the exploring party themselves undertook this work, they would be engaged upon it for $4 \times 2 + 2 \times 4 + 1 \times 6 = 8 + 8 + 6 = 22$ stages.*

The following little Table (8) shows how much delay is caused by employing the method of repetition for the first few stages:—

Number of stages during which the repeating method is used	1	2	3	4	&c.
Additional number of stages that have to be travelled over by parties who adopt it	2	8	22	52	&c.

The first column, and to a lesser degree the second one, are available for practical purposes.

* It would be more convenient to the exploring party to transpose the order of their trips, and to adopt that shown in diagram (7); because, as their object is supposed to be to seek for water, if it be found near at hand, a more distant excursion becomes unnecessary, and the plan of (5) would enable them to push forward the earlier stages of their exploration with as little delay as possible.

Extreme distance attainable.—I next give a Table which shows the extreme distance to which a reconnaissance may be effected in the three simple cases of the binary system, and the total number of men, including the exploring party, that would be required to work it. The explorers are supposed to carry provisions just as their supporters do. If one or more of them be exempted from porterage, the extreme distance that can be reached will be somewhat diminished :—

TABLE 9.

		No "repetition" employed.			First stage repeated.			First and second stages repeated.			
Number of days' rations conveyed by each member of the entire expedition		$1\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	
Number of additional days' journey required owing to the employment of "repetition"		0	0	0	1	2	3	4	8	12	
	Organization.	Total number.									
Organization and numbers of the entire expedition.	E	e	1	2	3	$1\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	2	4	5	Extreme distance attainable.
	E + e	$2e$	$1\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	2	4	6	$2\frac{1}{2}$	5	$7\frac{1}{2}$	
	E + e + $2e$	$4e$	2	4	6	$2\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{1}{2}$	3	6	9	
	E+e+$2e$+$4e$ &c.	$8e$ &c.	$2\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{1}{2}$	3	6	9	$3\frac{1}{2}$	7	$10\frac{1}{2}$	

When men only are employed, e refers to their number; but when horses and men are employed together, e stands for the number of horses, each of which is supposed to be accompanied by one or two men, and carries provisions accordingly. (*See* Table 2.)

We may therefore conclude that it is easy to organise an expedition, on the binary method, which shall be able to reach and to return from points in the heart of the desert at the below-mentioned distances, without the sacrifice of a single meal, and without obtaining any other provisions than those carried by it from the camp whence the start was made :—

TABLE 10.

	In a grassy but waterless country.	In a perfectly barren country.
By caravans composed—		
of Horses in harness	From 7 to 9 days' journey.	From 4 to 6 days' journey.
of Pack horses	,, 4 to 6 ,,	,, 2 to 3 ,,
of Parties of men ..	,, 2 to 3 ,,	,, 2 to 3 ,,

I need not enlarge on the vast increase of field that the adoption of the above method would give to the excursions of an explorer.

A well-acclimated horse can barely be driven for four days without water in an arid country, two days out and two days home; he certainly would succumb before the close of the fifth day: and here we see that, by carrying no extraordinary weight, and by using no impracticable size of caravans, a distance of up to nine days' journey out and then back again, or 18 days in all, can be accomplished without any stint whatever as regards their commissariat.

It is not easy to specify the average distances that may be accomplished by horses working for their lives, upon short rations, but I think that the gain in using my plan may be moderately stated thus:—

A horse that carries no water may, at the risk of his life, accomplish 4 days' journey; viz.	2 out and 2 home.
A horse that carries 5½ day rations may, without stint, accomplish 6 days' journey; viz.	3 out and 3 home.
A horse that carries 5½ day rations may, at the risk of his life, accomplish 10 days' journey; viz. ..	5 out and 5 home.
A horse, backed by a supporting party, and that carries 5½ day rations, may, without stint, easily accomplish 18 days' journey; viz...	9 out and 9 home.
A horse, backed by a supporting party, and that carries 5½ day rations, may, at the risk of his life, accomplish 22 days' journey; viz...	11 out and 11 home.

It will make the disposition of the entire party perfectly intelligible if, in any case that may be fixed upon, a schedule of their intended proceedings be drawn out on a large sheet of paper, according to the form of Table 11. In it I have taken for an example those of a party aided by two sections organised after the binary system, each individual carrying 3½ day rations, and two meals being issued per day. The exploring party is represented by E, and I will suppose it to consist of three men; and, therefore, the two sections which are represented by A and B will consist respectively of six and of three men. The small figures, 6, 3, 3, refer to the number of meals consumed or câched by the parties to whose names they are attached and at the places where they are entered;* by the addition of these numbers together we obtain the results printed at the foot of the several columns. For distinctness sake I have been obliged to withhold all reference to the meals carried by the relief parties, whose proceedings are indicated by small letters, *a* and *b*, and who form an expedition entirely self-sustaining and independent of the main one.

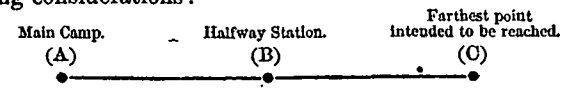
* It is not in the least necessary that a câche should be made at every place where a meal has to be consumed. It would be quite sufficient if a double or a treble one, as the case might be, were formed at each encampment from which a section turns back.

TABLE 11.

NO REPETITION.											FIRST STAGE REPEATED.										
	CAMP.	Encampment at end of ¼ day's journey.	of 1 day's journey.	of 1½ " "	of 2 " "	of 2½ " "	of 3 " "	of 3½ " "	of 4 " "		CAMP.	Encampment at end of ¼ day's journey.	of 1 day's journey.	of 1½ " "	of 2 " "	of 2½ " "	of 3 " "	of 3½ " "	of 4 " "	of 4½ " "	of 5 " "
Before starting	A B E										A B E										
Noon of 1st day		6. 3. 3. A B E										6. 3. 3. A B E									
Evening of 1st day			6. 3. 3. A B E										6. 3. 3. A B E								
Noon of 2nd day		6. A		3. 3. B E								6. 3. 3. A B E									
Evening of 2nd day	A				3. 3. B E						A B E										
Noon of 3rd day	A			3. B			3. E					6. 3. 3. A B E									
Evening of 3rd day	A		3. B					3. E.					6. 3. 3. A B E								
Noon of 4th day	A	3. B							3. E			6. 3. 3. A B E									
Evening of 4th day	A B									3. E					6. 3. 3. A B E						
Noon of 5th day		a b							3. E			6. A					3. 3. B E				
Evening of 5th day			a b					3. E					6. A					3. 3. B E			
Noon of 6th day		a		b		3. E						6. A					3. B		3. E		
Evening of 6th day	A				3. b E						A				3. B				3. E		
Noon of 7th day	A			3. b E								a		3. B						3. E	
Evening of 7th day	A		3. b E										3. a B								3. E
Noon of 8th day	A	3. b E										3. a B							3. E		
Evening of 8th day	A B E										A B								3. E		
Noon of 9th day												a b						3. E			
Evening of 9th day													a b				3. E				
Noon of 10th day												a		b		3. b E					
Evening of 10th day											A				3. b E						
Noon of 11th day											A			3. b B							
Evening of 11th day											A										
Noon of 12th day											A	3. b E									
Evening of 12th day											A B E										
		A's load. — 42 ½-day rations, carried by 6 men = 8½-day rations per man.		B's load. — 21 ½-day rations, carried by 3 men = 9½-day rations per man.		E's load. — 21 ½-day rations, carried by 3 men = 3½-day rations per man.						A B E's load. — 84 ½-day rations, carried by 12 men = 3½-day rations per man.		A's load. — 42 ½-day rations, carried by 6 men = 8½-day rations per man.		B's load. — 21 ½-day rations, carried by 3 men = 8½-day rations per man.		E's load. — 21 ½-day rations, carried by 3 men = 3½-day rations per man.			

Relief Parties.—It is easy to learn from a Table, like the above, at what date the return sections of a supporting party may be re-dispatched with fresh provisions, in order to meet E on their return, and to act as a "relief" party in case of accident or distress, and also at what depôt they may expect to meet him. There is always a great facility in sending these relief parties, and they are able to

carry a large surplus store of water, as may be understood from the following considerations:—



All the sections that turn back at B, or short of B, have time to return to A, reprovision themselves there, start afresh, and meet the exploring party on its return to B: because, from B to A and back again to B is exactly equal, in days' journey, to the distance from B to C and back again to B. If the explorers returned prematurely, the meeting would take place between A and B.

When the individuals composing the relief party travelled on their first journey, they had not only to feed and to câche for themselves, but they had also to feed and câche for the exploring party, and perhaps for other sections also; but, when they travel as a relief party, the equivalent to these latter supplies remains on hand as a clear overplus, to be disposed of for purposes of relief. It somewhat complicates the question to attempt the method of *repetition* with relief parties; however, the first section can always be redispatched immediately after its return to camp, with a heavy load of provisions to câche at the end of the first stage, where it will meet the second section, and whence it will return with it to camp, and then, having reprovisioned themselves, they may start afresh as a relief party.

Conclusion.—It would take far too much space if I were to attempt to enter minutely into many particular cases, and it would be unnecessary if I did so, because no adventurer would ever attempt a more complicated experiment than that I am about to describe without having repeatedly practised his party at simpler ones, neither would he undertake the simplest one without having had sufficient rehearsal of it on a small scale to satisfy himself and his associates that they understood it perfectly.

The general rules to be adopted are to keep to steady day's work, neither more nor less; to mark the roads, and number the camps, so that there can be no possibility of mistake about either of them; and to make the cleverest câches they can. Very little delay need be apprehended from the straying of cattle, as they would soon learn to crowd to the camp, as to a water-tank, when they were thirsty.

For the purposes of câching and conveying water, and most kinds of food also, I know of no plan equal to that of employing one-gallon or half-gallon tins painted white, and packed securely with grass in strong hampers. 10 lbs. weight of water, or an imperial gallon, contains 277 cubic inches: and the canisters that appear to me most

convenient in size would be $4\frac{1}{2} \times 8$ inches at the base, and 8 inches high with an extra inch for the neck. 50 lbs. weight of water, in four whole canisters and two half ones, would pack side by side in a hamper measuring over all 11 inches $\times$ 10 inches $\times$ 2 feet 5 inches. Men would carry their loads in the way they were best accustomed to. One good plan is to drop the vessels into loose fitting bags, and to sling these at either end of a pole borne upon the shoulder. The mouth of these canisters should be like that of an ordinary tea-canister, closed with a cork, and the cork covered with a close-fitting tin cap, to keep out ants and other small marauders. There can be no mistake about the number of these tins that would be required, as the Tables show the number of days' rations that must be carried for each individual of the party. The cost of a number of these vessels, sufficient to supply the wants of a large party for a long series of expeditions, would not exceed that of a single horse. If from any cause the rations appear inadequate, no danger or hardship need result to the party in consequence. It is always open to the leader of it to curtail his excursion, and to give to his cattle and men the water that was stored for their use during those stages which he now determines to stop short of. And, again, the safety of their return journey need not wholly depend upon that of the câches, since it has been shown how easy it is to dispatch relief parties for further security.

I sincerely trust that explorers in Australia may be induced to give a fair trial to my proposed method; and I would suggest to a person who wished to do so that he should make a few preparatory attempts on foot, after the following simple arrangement, with a description of which I will close this paper. Let the explorer adopt as his immediate object the investigation and survey of a line of country to the distance of one and a half day's journey into the heart of the desert. He need not carry any load of food, but let him select 7 natives as porters, and prepare the following outfit:—

21 half-gallon water tins, of the description mentioned above; viz. 4 × 4½ inches at base, and 8 inches clear height, exclusive of the neck.

21 food tins; being simply square tin boxes with close-fitting lids, 4 × 4½ inches at base and 3 inches high, a pile of three of them being of the same size as a water tin.

21 meals (of ½ day rations each) of food; viz.: tea, sugar, flour, and salted meat; each ready to pack up in its separate food-tin.

14 light canvas bags; each capable of holding two water tins, or else one water tin and a pile of three food-tins. The bags to be adapted for slinging from a pole, and having long enough necks to admit of their being sewn up or otherwise well secured against tampering.

1 large spare bag; a very light one, capable of holding four sets of food and water tins.

7 strong light poles; six feet in length, to be carried on the shoulder, to each end of which a canvas bag is to be slung; the one bag containing

2 water tins, and the other 1 water tin and 3 food tins, or exactly three complete meals in all.

The expedition will consist as follows:—

The explorer E_1 carrying nothing, and his attendant E_2 carrying 3 meals and the spare bag .. .. or 3 meals in all.
Two natives B_1 and B_2 carrying 3 meals each .. .. or 6 meals in all.
Four natives A_1 A_2 A_3 A_4 carrying 3 meals each .. or 12 meals in all.

Let them start in the early morning and travel for half-a-day, say 4½ hours, without stopping; then let them encamp at Camp I., and take a meal out of the loads of the party A, the packages of B and of E being left untouched: there are 8 mouths to feed and 12 meals, leaving an overplus of 4 meals. In the afternoon the party A is sent back to camp with 8 empty sets of tins, and each of the parties B and E take 2 meals and câche them separately, and then proceed on their journey for another 4½ hours. At night, at Camp II., B's packs are opened, the 6 meals are taken out, and 4 of them are eaten by B and E, while the 2 remaining ones are given to E, who câches them. In the morning, B turns back and the party E pursues its journey (B opens its câche at Camp I. at midday, and, having eaten the 2 meals contained in it, stores the empty tins in the places left vacant in its bags by the two meals left behind with E, and starting in the afternoon, reaches the home party at night). The party E travels on for half-a-day to Camp III., and then its men eat two of their meals; the third is intended to be kept as a reserve in case of any emergency. In the afternoon they fall back upon Camp II., dig up their câche, eat the food contained in it, and place the empty tins in the spare bag. In the morning they start for Camp I., reach it at noon, dig up the câche, eat their meals, and carry off the empty tins as before, and reach the home party at night.

The next adventure, which I will not describe in detail, might be to leave the parties A, B, and E exactly as before, but to lade the explorer E_1 with three meals, and also to make a repeated journey of one long half-day's stage. In doing this, 16 extra sets of tins would be found necessary, and a distance of 2½ days' journey from camp would be finally reached.

The PRESIDENT directed the attention of the Fellows to the value of Mr. Galton's labours in elaborating such a scheme for the guidance of travellers in dry and arid countries, and mentioned his calculations as being analogous to those by which a quartermaster-general enabled troops to make effective marches.

DR. BARTH, F.R.G.S.—I think the plan proposed by Mr. Galton suitable to a country like Australia, where the danger of the câches being destroyed by barbarous tribes is not very great; but it is not applicable to such a country as Northern Africa, where a depôt cannot be deposited without running the risk of

being discovered by the tribes who constantly infest the roads, so that the supplies may be destroyed or removed. In traversing deserts like those of Northern Africa, I think a traveller must always rely upon the provisions he takes with him. I have travelled through the desert with two horses, and I was obliged to take corn for them for sixty days. Water is found at the different wells, at four, five, and six days' distance apart. Mr. Galton's calculation with reference to the quantity of water required by the horses is quite right, for I found, when water was not abundant, that a skinfull, from 40 to 50 lbs. weight, was sufficient for each horse. There was very little herbage, and I gave each animal about 10 lbs. weight of corn per day, and they went on very well with that supply.

MR. ATKINSON, F.R.G.S.—The mode in which I travelled over the steppes of Central Asia is very different from what Mr. Galton has described. In most parts of these regions (except in the Gobi) we can find water by digging into the sand, from 5 to 7 feet deep. The water is very brackish, still the horses will drink it, and tea can be made with it—it is not an agreeable beverage—necessity alone makes a man drink it. We had a mode of travelling much more rapid when crossing the arid plains than that suggested by Mr. Galton. To travel with wheeled carriages is absolutely impossible. We travelled on horseback, each individual of the party taking three horses and 3 or 4 lbs. of prosei, a species of millet, in a small bag slung to his saddle-bow. This and a glass of tea or water make a meal: in this way about 300 versts can be traversed in twenty-four hours. On our journey we frequently endured great privation from want of food, and in many instances we suffered from want of good water, as the tea made with water from the well was often exceedingly nauseous and unwholesome.

COUNT STRZELECKI, F.R.G.S.—I can bear testimony to the value of Mr. Galton's suggestions with regard to the deserts already ascertained. There are parts of North America, where the United States Government is now engaged in an expedition against the Mormons at Salt Lake, a district separated from civilisation by a belt of desert, similar to a desert in Africa, where relief parties pursuing the system suggested by Mr. Galton would be of the greatest possible value. There are deserts in South America that I have visited to which the system would be perfectly applicable; as also the two routes of desert in Australia, one in the northern and the other in the southern region—where it is well known that beyond a certain distance you cannot penetrate without taking supplies for both men and beasts. But in passing through a *terra incognita* to a given point on the chart—when you know nothing beyond the horizon you see—it is almost impossible to apply a system or devise means which may insure you against the want of water and provisions. To advance boldly with supplies calculated approximatively upon the time requisite to accomplish your section of exploration is all that you can do. During five years of my surveys in Australia, it was my lot on one occasion to travel through a country untrodden by white men. The party consisted of seven men and six pack-horses, carrying our supplies of flour, tea, and bacon, sufficient for five months, the maximum of time calculated as necessary for the accomplishment of the self-imposed task. Notwithstanding the unexpected ranges of mountains and rivers which we met on our way, and which retarded our progress, we were actually within 35 miles of our destination, when our journey was suddenly arrested, not by want of provision or water, but by a belt of impracticable brushwood, which forced us to abandon the pack-horses and collections, and cut our way through at a rate of 1½ mile a day the best we could. In such explorations there is no system which can extricate you, except common prudence, determination, and extremely vigorous constitutions. I believe that the expedition of the United States Government failed for want of a proper system of conveying the troops through the desert, which is not perhaps very

extensive; but still presenting such difficulties that without an organised system of provisioning troops as suggested by Mr. Galton, it is impossible for them to traverse it.

MR. PLINY MILES, of the United States.—I have travelled through some of the wild parts of North America, and I can confirm Dr. Barth with respect to the danger of the natives discovering and destroying the câches. A method found successful for preserving a câche has been adopted by some American travellers. At a convenient distance from, but not too near the real câche, they make a false one, put in a small quantity of provisions, and make numerous footmarks about it. The Indians come and find the place, and suppose that it is the only câche there. But it requires a great deal of art to deceive them. In some seasons of the year travellers get along better with a supply of parched Indian corn than to rely entirely on animal food. The corn is light and very nourishing. Buffalo meat, dried and salted with care, and placed in câches, will keep a long time. I quite agree with Count Strzelecki as to the cause of the failure of the United States expedition.

MR. GALTON, F.R.G.S.—I ought to explain that I consider my method especially applicable to untraversed tracts of open country, that resist the efforts of explorers on account of their aridity and extent, such as exist in many parts of Australia, and which it is the object of an advancing civilization to explore systematically. In countries that are half desert, where there are natives prowling freely about, my method would be of less service, even if the security of the câches were unquestionable. When expeditions were planned upon a large scale the câches and depôts might easily be guarded by encampments of small parties of men detached for the purpose.

The Second Paper read was:—

Narrative of a Journey in the Bushman and Namaqualand Districts of the Cape of Good Hope, with Map. By ROBERT MOFFAT, Esq., F.R.G.S., Government Surveyor. (1st Part.)

Communicated by the Right Hon. H. LABOUCHERE, F.R.G.S., H. M. Secretary of State for the Colonies.

[This paper will be printed in full in the Journal.]

THE PRESIDENT.—Our thanks are due to Mr. Moffat for his able memoir, and also to Mr. Labouchere of the Colonial Office for his kindness in communicating it. As the brother-in-law of Mr. Moffat, our valued friend Dr. Livingstone, is present, I will not occupy your time, but at once call upon him to explain what he knows of the region described. Before I do so, however, I must express my sincere gratification at the announcement made by the Chancellor of the Exchequer in the House of Commons, that Her Majesty's Government has decided to give due and becoming aid to Dr. Livingstone, so that he may pursue his researches in Africa, and overcome those difficulties which have hitherto prevented so many travellers from penetrating into the interior of Africa. I may also state that Government has written most explicit instructions to our minister in Portugal, to aid Dr. Livingstone by every means in his power, and to prefer a similar request to the Portuguese Government. I have only to express my hope that the Government will appoint two or three men of science to accompany Dr. Livingstone, and to assist him in developing the natural history and resources of the country, in accordance with wishes long entertained by ourselves, and in compliance with the request of the British Association for the Advancement of Science.

DR. LIVINGSTONE, F.R.G.S.—The first remark that I would make on Mr. Mof-

fat's paper is this, that in such papers as we have heard to-night we see the great value of the Geographical Society. We learn what to avoid, and that is something. In 1852, when I was at the Cape, an enlightened colonial governor sent the Rhadamanthus steamer round to this part of the west coast, in a great hurry, to prevent a reported American vessel sending in gunpowder to the Caffres. I do not know whether any person raised the rumour because he was anxious to get in his own gunpowder on the other or eastern side of the country; but had the governor known what we have heard to-night, he might have scorned the report with—"They might as well attempt to send it to the moon." The captain of the Rhadamanthus, long before the country was known and the chart laid down by Captain Nolloth, went and galloped about, and did not find a single soul, nor anything else. The country was entirely parched up; and as for carrying gunpowder across to the Caffres, why, I defy anybody to carry himself at that particular season. This country is interesting to me, because my father-in-law, Mr. Moffat, lived there forty years ago, near the part called Pella. At that time missions were just beginning. People did not know much about them, and some of the sagacious men of that day thought that "any man who could read a Bible and make a wheelbarrow was fit to be a missionary." Mr. Moffat went out when these principles were current, and his salary was the enormous sum of 25*l*. a year. He proceeded to that part of the country near Pella, and took up his residence in a Caffre mat-hut, with a half-caste Dutchman, named Africaner, a clever man, but a great enemy of the colonists. The huts of the village were situated in a circle, and in the middle of the circle the cattle were kept. Mr. Moffat was sometimes aroused by a pair of bulls getting up during the night to settle their quarrels, one sometimes pushing the other into the hut. All the food he had for nearly two years was milk, zebra meat, or any other wild meat that he could get by his gun. After living that period at Pella, and finding it totally impossible to elevate the people, he set off up the Orange River on horseback, and suffered very great privations. He had no bedding with him, and he and his companions sunk holes in the sand as beds, and covered themselves over with sand. One of the men thought it safer to sleep on the surface, for, said he, a lion might come and disturb them in the night, and those covered with sand could not run off; upon which Mr. Moffat remarked, "A lion will not take a head so long as he can get a body." He succeeded in reaching Griqua Town; and finding a better country, he resolved to establish a mission in the Bechuana lands. He found the country, just as his son, the present Mr. Moffat, junr., had described it, exceedingly arid and difficult to traverse. This being the nature of the country, and the fact being comparatively well known, it is quite marvellous that another colonial governor should pass a gunpowder ordinance, whereby our friends, the Bechuanas, could not get a single ounce of gunpowder to defend themselves against the Boers. The Bechuanas could not attack the colony on that side; this arid country was a sufficient defence, and the Bechuanas had never attempted it, nor been guilty of cattle stealing even. There was a complete barrier against them in the nature of the country, and yet the colonial governor passed a law whereby the colony engaged to prevent ammunition going to them. Yet the Boers, who had been fighting against us, can have as much as they like. We condescend to act as policemen to the Boers, and lose our good name in consequence. In other parts of the country, far to the north, and at least 400 miles in the interior, the English are known as "the friends of the black man;" yet here this poor governor, simply by not being "up in his geography," destroyed the influence of the English name. Mr. Moffat had referred to the Bushman. It is a country just adapted for the Bushmen. The vegetation is capable of sustaining a great deal of drought, and there are numerous tuberous roots on which these people can subsist. Sheep can likewise subsist on those plants during certain parts of the year.

Mr. Moffat refers to certain fountains in calcareous tufa towards the middle of the country. It is found that all these fountains if cut into from a lower level will yield a perennial spring. I have seen farmers, guided by a patch of rushes, begin a deep canal a mile off, and cut up to the rushes, and so get a stream which runs the whole year. Occasionally I have seen them cut into a well that had ceased to flow, and get a constant supply of water. The Boers in the colony are enterprising and industrious, and are developing a trade in wool. Lately, Mr. Salt has sent out twenty alpacas to the Cape, which I have no doubt will succeed well. There is every probability that in the course of time it will become a more flourishing colony.

The Third Paper read was :—

Latest Accounts of the Fate of Dr. Vogel.

Communicated by the Right Hon. the EARL of CLARENDON, K.G., F.R.G.S., Foreign Office.

MY LORD, Alexandria, October 23, 1857.

I have the honour to acknowledge the receipt of Mr. Hammond's despatch, Consular No. 8 of the 9th ultimo, instructing me to direct the British Vice-Consul at Khartúm to make all possible inquiries as to the fate of Dr. Vogel, the African traveller, and in the event of its being ascertained that Dr. Vogel is in a state of captivity, to authorize the Vice-Consul to adopt the most effectual measures he can devise, and if necessary to offer a ransom, for Dr. Vogel's release.

I immediately transmitted the necessary instructions to Mr. Vice-Consul Petherick at Khartúm; but having since learnt that there is an ambassador from the King of Darfur to the Viceroy of Egypt, now at Cairo, I have, through Mr. Messarra, the Dragoman of this Consulate-General, been in communication with that personage, and I transmit a report of a verbal statement made by the Ambassador of Darfur to Mr. Messarra, which I fear almost places beyond a doubt the reported murder of Dr. Vogel by the King of Wadai.*

I have, &c.,

(Signed) G. GREEN.

The Earl of Clarendon, &c.

Verbal Statement of SAID MOHAMET SAANGHITI, *Ambassador from the King of Darfur to the Viceroy of Egypt.*

Cairo, 19th October, 1857.

Before my departure from Darfur I was informed by several persons (natives of Senegal) that three European travellers, under the names of Abdul Carim, Abdul Wahed, and Abdul Samad, had arrived from Bengazi at Fezzan, and from thence to Bornu, where they met Seik Umar, the prince governing that district, who received them very well, and gave them letters of recommendation to the governors of Begharum, Mandara, Adamao, Houssa, and Malla, provinces inde-

* *See* Proceedings R. G. S., No. I., vol. ii., p. 30.—ED.

pendent of each other. Abdul Carim, who was the chief, sent Abdul Wahed to the east, that is to say, to Beghami, and other places in that direction; Abdul Samad went towards the south, that is to say, towards Mandara and Adamao; and Abdul Carim in person proceeded towards Houssa and Malla.

Abdul Carim, on leaving Bornu, proceeded to Zandar, where he formed a friendship with a scerif, named Abdul Azig ben Saleh, with whom he left all his money and effects, and departed for Timbuctu, and attempted to enter Malla, where they were inclined to kill him; but he was protected by a man of influence, named Seik el Baccai, of Timbuctu, who escorted him with a number of persons, and enabled him to visit the whole province of Malla, conducted him safe out of the same, and caused him to be escorted by a certain Sed Ahmed Uadawi, and some other eight persons, back to Bornu; where he found that Abdul Rahman had usurped the kingdom of his brother Umar, and had plundered everything, among which were the possessions of the scerif Abdul Aziz; whereupon Abdul Carim demanded of Abdul Rahman that he should restore to him the property he had deposited with that scerif, which was accordingly restored to him. After waiting at Bornu some time for the return of his companions, and not seeing them appear, he departed for Bengazi, or Senegal, to return to his own country, after his great fatigues and perils, having obtained his object, of taking representations of all the most remarkable things, and the most interesting views of the interior of Africa.

Abdul Wahed (Dr. Vogel) departed from Bornu for Bagirmi, where he was well received; and, after having well visited all localities as he wished, he proceeded to Madagu, and from thence passed to Borgu, that is to say, Waday, where he met the vizir of the prince of Wadai, named Simalek, who treated him well. He afterwards entered the interior of that province to the capital city called Wara, where the Prince Sciaraf, so called Sultan of Waday, who is now paralytic, resides; but in the neighbourhood of Wara there is a sacred mountain, the ascent of which is prohibited to all persons. Abdul Wahed, whether informed of this or not, ascended this sacred mountain; and when the prince learnt it, he ordered him to be put to death, and so it was. The intelligence of this reached Darfur about seven months ago. When Mohamet Hassan, King of Darfur, heard it, he was much displeased, and sent to reprove the Prince of Waday, otherwise Borgu.

In respect to the third, *i. e.*, Abdul Samad, nothing has been heard, but neither of these three ever reached Darfur.

DR. BARTH, F.R.G.S.—The statement of that Arab (the messenger of the King of Dár-Fúr) contains accurate information about the routes which we pursued, and even gives correctly the names of those very men who gave me protection. With regard to what is stated about Dr. Vogel's final fate, there is no doubt that he was well received on his arrival at Warâ. Whether he went direct from Bornú, or went round the north side of Lake Chad, I do not know; but from the contents of the letter received by H.M.'s Consul at Tripoli from the Sheikh of Borgú, I am inclined to suppose that he took the latter road. At all events, it seems that in the beginning he wanted to avoid Wadái, because a civil war had been raging there. I recommended him to stay at the capital of Bagirmi, the ruler of which country I had befriended, till a messenger might arrive from the King of Wadái to take him safely to Wára. But after leaving Bagirmi and visiting the provinces of Fittri and Middogo, he seems to have gone to the north of Wadái to a place called *Wadi Orádha*, and I suppose the King of Wadái sent messengers to the place to fetch him. At least such is the statement contained in the letter of the Sheikh of Borgú, in which, however, I do not place implicit confidence. There is certainly a holy hill in Wára, the capital of Wadái, just over the palace. Wára is enclosed by two hilly chains, on the east and west side, leaving only two narrow entrances, one from the north and the other from the south. The king's palace is on the slope of the eastern chain; and on the top is said to be a holy hut, where every new king must reside for seven days. Whether it be true that Vogel wanted to enter this place, in order to investigate its nature, and was executed for the attempt, as alleged, I do not know, but think rather improbable; although I must say, that I myself at present entertain little hope that the courageous traveller be still alive. It would be a great pity if his interesting journals at least should not be saved. His papers, as far as they were taken home by Corporal Macguire, who is stated to have been slain at the well Belkashi farri, six days' journey from Kuka, if they were not destroyed on the spot, may have got into the hands of some of the chiefs connected with the tribe of the Kél-owí, the inhabitants of the country of Aïr, although those freebooters who continually infest the road from Bornú to Fezzán do not acknowledge the supremacy of those chiefs. I do not expect that the chief of Bornú will be able to do anything in this respect, because of the Tawárek, who infest those roads, being his greatest enemies. But I think the chiefs of the Kél-owí, through whose territory we passed in going to Negro-land, would be more likely to succeed in endeavouring to get some of them back—provided they were not destroyed on the spot or scattered about. I myself, on my former journey, was robbed, after serious fighting, of all my property; and although this had happened on the border of the territories of the Bashá of Tripoli, and of Mohammed Ali of Egypt, both of whom had secured me their protection, I have seen again neither the smallest scrap of my papers nor any of my things.

Fourth Meeting, Monday, January 11th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Dr. Wm. Camps and the Rev. A. P. Moor were presented on their election.*

ELECTIONS.—*J. H. Baxendale, Esq.; G. Bonner, Esq.; Lord Viscount Bury*, M.P.; *Lord Claremont; Chichester Fortescue, Esq.* M.P.; *G. Grote, Esq.; Edward Hertslet, Esq.; Captain Sir Wm. Hoste, Bart.*, R.N.; *Captain*

C. Johnson; Lord Keane; J. W. Malby, Esq.; Ch. P. Serocold, Esq.; Captain J. Stopford, R.N.; Anthony W. Twyford, Esq.; Captain S. Webb; and James Young, Esq., were elected Fellows.

ACCESSIONS.—Among the more important donations received since the last meeting, were Plans of Lucknow, by the Hon. East India Company and James Wyld, F.R.G.S.; Fullarton's and Spruner's Atlases; Admiralty Charts; Track Surveys of the River Paraguay, by Captain Page, of the United States Navy; Plan of a portion of the Great Orange River, and Map of Little Namaqualand and Great Bushman Land, by R. Moffat, Esq., F.R.G.S., &c.

The PRESIDENT said: Before we proceed to the ordinary business of the evening, I feel impelled by affection and duty to call attention to the great loss which the scientific world has sustained, and geographers in particular, by the decease of my illustrious friend, Admiral Sir Francis Beaufort. I know it is unusual to allude to deceased individuals except in the anniversary address, and when the occasion for that arrives I will endeavour to do justice to the merits of this great geographer. I now depart from the ordinary custom of the Society that we may pay a *special* mark of respect to the memory of Admiral Beaufort, the perfect type of an English seaman, a disinterested, generous, noble-hearted Englishman, who devoted his whole energies to the advancement of geographical science, who lost no opportunity of serving his friends, and who, above all, was the strenuous and unceasing advocate for the discovery of traces of the expedition of his old and cherished friend, the illustrious navigator Franklin.

I have next the pleasure to state that Lord Clarendon has communicated to us the expression of his wish that the Society should place before his Lordship their suggestions with reference to the proposed expedition of Dr. Livingstone to ascend the Zambesi and explore the interior of Africa. Having brought that subject under the consideration of the Council, I have the satisfaction to state that my associates unanimously approved of all the suggestions which Dr. Livingstone had proposed to Lord Clarendon. Dr. Livingstone explained his whole plan to the Council, and gave in the names of the gentlemen whom he had fixed upon as the most proper to accompany him. It is no breach of confidence to read the names, because they have been approved, not only by the Council of the Society, but also by the Zambesi Committee of the Royal Society. The first is Commander Norman B. Bedingfeld, R.N., F.R.G.S., who is known to geographers especially for his exploration of the Congo. Dr. John Kirk, M.D., F.R.G.S., is proposed to go as the surgeon and economical botanist of the expedition. Possessing a sound knowledge of botany and natural history, he is also a good animal physiologist, and will be able to inquire into the nature of that remarkable insect the *tsetse*, which destroys so many animals in South Africa, and possibly to devise some remedy for this scourge. I may add that Dr. Kirk was recommended by Sir W. Hooker and Dr. Hooker and Dr. Belford. As a mining geologist I have recommended Mr. Richard Thornton, of the Government School of Mines; and you all know the importance it will be to Dr. Livingstone to be accompanied by a person who can point out to him the real value of ores and minerals during his progress, and test the qualities of coal in that country.

As it is desirable that the artist should be a person thoroughly competent to delineate effectively the features of the country, the expedition is fortunate in having secured the services of Mr. Thomas Baines, F.R.G.S., who has distinguished himself by numerous drawings exhibited in this room, and who is

well known both by his travels in tropical Australia and in South Africa, and who has shown his competency in plan and chart drawing. Dr. Livingstone will farther take out his brother the Rev. Charles Livingstone, as his secretary. Mr. Livingstone is to take charge of the establishment, which it is proposed to fix for a year upon the confluence of the river Kafue with the Zambesi.

I need not tell you that the Council will afford Dr. Livingstone every possible aid as to advice, instruments, and method of observation, so that everything may come before us eventually in a well-digested and graphic form. Lastly, I have to state that the Council has expressed a very decided wish upon one point which they hold to be of the greatest consequence. Considering the well-known unhealthiness of the Zambesi below Tete, the Council urgently recommend to Her Majesty's Government that Dr. Livingstone and his associates be forwarded from the mouth of the river to Tete in a decked steam-vessel of *light* draught with as much celerity as possible, and that the steam-launch now constructing for the exploration of the upper part of the river by our associate Mr. Macgregor Laird be employed to transport the party from that point upwards only.

The Papers read were—

1. *Extracts of Reports from the Niger Expedition.* By Dr. WM. B. BAIKIE, R.N., F.R.G.S., and Mr. D. T. MAY, R.N., F.R.G.S.

Communicated by the Right Hon. the Earl of CLARENDON, K.G., F.R.G.S., H.M. Secretary for Foreign Affairs.

Dayspring, off Rúbba, 28th Sept. 1857.

MY LORD,—As I expect in a very few days to be able to forward letters and despatches to England, through the Yóruba country and Lagos, I shall draw up for your Lordship's information an account of the proceedings of the Niger Expedition up to the present time.

At the date of my last despatch (No. 7, 7th July) we were just on the point of leaving the Brass River, and crossing to the Nun by a creek which I had the day previously caused to be examined. For a vessel of the size and draught of the Dayspring there is at all times sufficient water; but the schooner we had in tow being larger and deeper, she grounded several times, and we had to wait for two successive flood-tides before we could get her off. We spent altogether 28 hours in this gloomy mangrove creek, which is in some places not more than 30 yards wide. During the night we passed there we were nearly literally devoured by the myriads of mosquitoes which swarmed around while we lay aground. I took advantage of the time to examine in our boats some other portions of the network of muddy creeks which, as far as we went, were laid on our chart, and I got a native, who was induced to come on board, to spend the forenoon in giving to the Rev. Mr. Taylor of the Church Missionary Society a few specimens

of the Brass or Nímbe dialect, which is, as yet, almost unknown to philologists.

We took our farewell of the sea and commenced our ascent of the Niger proper at daylight on the 10th of July, and proceeded through the delta at rather a slow rate, partly on account of numerous stoppages, but chiefly retarded by having to tow a heavy vessel against a strong current. I communicated with all the larger and with most of the smaller towns and villages in the Delta, endeavouring to establish friendly relations with the chiefs and people; announcing to them the views of Her Majesty's Government, and warning them against any hostile or predatory acts on their part, and was always successful in making friends with them. They invariably promised to behave properly towards white men, and to commence proper trade with them. At some places where Europeans had never previously stopped there was sometimes a little suspicion on the part of the inhabitants, but in such cases my practice was to land with only two or three companions, and to assuage their fears. In one or two places they met us on the shore armed, but this was not with any hostile view, but only as a matter of precaution, to be ready for any emergency. The product of this tract of country, extending along the river for upwards of 100 miles, is palm oil, the supply of which is very abundant, but which might, were the demand for it carried to their own doors, be very greatly augmented.

On July 20th we anchored off the town of Abó, which may be considered as the extreme apex of the delta, and at this populous and important place we delayed for three days, making arrangements with the chiefs and people, who are very much disposed to be friendly: indeed, our only difficulty arose from the extremely grasping character of one of the chiefs, who was unwilling that any other district should benefit from our arrival except his own.

We called at several other large towns in this, which is the Igbo (pronounced Iho) country, and at one, named Onitshá, about 150 miles from the sea, we remained a week to enable the master of the steamer to erect a trading-house, and where we also made our first missionary establishment. This town had never before been visited by Europeans; but we easily secured the confidence of the people, and; on my asking from their king ground for our purposes, it was readily granted. Here also I left three men, who had accompanied me from Sierra Leone as settlers; they being either Igbo or of Igbo descent, and who thus formed the beginning of an immigration of liberated Africans from Sierra Leone into these their native lands. This town, Onitshá, is well placed on rising ground with a dry soil: it is the key also along the river to the extensive Igbo

districts, and is the proper spot for a trading nucleus; on these grounds I recommended it, and it will doubtless be retained as a missionary establishment, though whether as a trading post I cannot say. The principal productions of Igbo are palm-oil and red wood. Cotton is grown for their own use, and might, if due encouragement were offered, be largely produced.

We next entered upon the Igára country, and on the 4th of August reached a large creek that had not been previously examined, and which we descended in our boat as far as time would allow. On the 5th we reached the capital, Iddá, where we found that the attá, or king, who reigned when I was in the Niger in 1854, was lately dead; but we saw his successor, a man of more pleasing manners and appearance than his predecessor, who readily renewed all former engagements with us, and who with all around him behaved in a very friendly way towards us. At Iddá I met a former acquaintance, Ama-aboko, chief at the confluence, who, being in a manner a dependant of Igára, was then attending the election of the new king. As formerly, he was extremely friendly, sent to his eldest son, who was acting in his absence, desiring him to assist us far as he could, and he sent with me one of his own attendants, to tell us the names of towns we might pass, and to introduce us at various places where we might visit. Igára yields a little palm-oil, some ivory, and cotton of good quality; but during the unpopular sway of the late attá, Igára lost many of her best people, who removed to other districts.

On the 10th of August we anchored at the confluence of the Chadda and the Niger, and on my landing at Ghébe, or Igbégbe, I was at once recognised and met with a very warm reception. The authorities at once gave us, on my asking them, ground both for a factory and for a missionary establishment, allowing us to select our own sites. Here most of us possess the confidence of the people so entirely, that I believe Mr. Crowther or myself could induce them to do anything we chose, within the bounds of reason. The inhabitants are much more civilized than any met with near the sea; they are quite devoted to trade, and under due guidance might soon be greatly improved.

I remained in this neighbourhood until the 27th of August, partly to advance, as far as I could, the settlement of traders ashore and to see the missionary establishment fairly started, and partly also to complete the triangulation of the hilly district which is characteristic of this region, and which, under the able conduct of Lieut. Glover, rapidly advanced towards completion. At the confluence we left the schooner George, which had been with some difficulty towed up

the river, and we also left Captain Alex. Grant, the sailing master, who was desirous of superintending his trading post.

On the 27th of August we left the confluence and entered the main stream of the Niger; and as there was plenty of water, we got on without difficulty, visiting all the larger towns, laying down the districts and countries, and, whenever practicable, ascending the hills for surveying purposes. At the large town of Egau (Egga of the charts), which was the farthest point reached by Captain Trotter in 1841, we remained for some days on very friendly terms with the people; this being the commencement of the extensive and important kingdom of Núfi (often Núpi), we were constantly referred to the king Assúmo Záki, who had just returned to his domains after an exile of twelve years, during which this unhappy country had been in a state of anarchy and confusion. The various rivals had been at length reconciled, and the two principal ones, viz. the king and his half-brother Dásabá, were living together. Very shortly afterwards, the news of our being in the river having reached the king, we were met by messengers from himself and his brothers, inviting me to visit him. We found on inquiry that they were residing at a temporary encampment, said to be near the banks of a small tributary stream, which we accordingly sought for, and ascended against a rapid current for about 15 miles to a small village, whither horses were sent for myself and party. A ride of about 14 miles through a fine but mild country brought us to the encampment, which had quite the appearance of a town, only that the huts, being temporary, were entirely constructed of straw, while the population, including women and children, could not be under 60,000; it was a finely chosen spot, although they had been induced to encamp there partly by accident, as the final battle in which their last opponent had been defeated and slain had taken place in this neighbourhood about three months previously. We were received most kindly and hospitably by all, and I spent nearly two days in the place visiting and making friends with all the principal people. The king himself and his half-brother Dásabá, who is a very intelligent person and really the working-man, were most kind, and during our stay we were feasted on, to us, the luxuries of milk, butter, and honey. Being, next to the Sultan of Sókoto, the most powerful chief in this part of Central Africa, I did all I could to cement a friendship, and made to all those of importance, or to those who showed civility towards us, such presents as I considered suitable. We next returned to the ship with no farther inconvenience than having to wade breast high after dark along a narrow muddy creek, which by the rise of the waters had become filled,

and intervened between the bank of the river and our road. It is the intention of the king and his friends, as soon as the dry season commences, to return to the town of Rábba and rebuild it, as it has now been a mass of ruins since he was defeated and driven away in 1844 or 1845.

Since we left the king's encampment at Bida we have continued our ascent, and on the 18th we reached Rábba. Here I have since remained to enable us to get our boilers and engines cleaned, some needful repairs completed, and a supply of wood obtained. We have also taken advantage of the time to rerate our chronometers, to fix the town accurately, and to prepare and finish despatches and tracings of our work for sending to England, and I have now on board a messenger kindly sent with us by the king of Núfi and Dásabá to carry our despatches to Hónu, as the two brothers possess considerable influence in the Jóruba country. I believe that with their aid there will be very little difficulty, if any, experienced in opening up a safe road from Lagos through the Jóruba country to Rábba, and establishing a regular postal communication; Rábba being also on the regular caravan route.

When our despatches shall have been forwarded it is my intention to continue the ascent of the river to endeavour to ascertain the navigability of the rocky channel said to exist below Búsa, during November to return to the confluence to meet the steamer then expected from England, by which I hope to receive some fresh chronometers and supplies of stationery, and then in December to return to Rábba for the purpose of making our journey to Sókoto, which is now impracticable from the state of the roads and weather, most of the low country being flooded, and severe tornadoes with thunder and tremendous falls of rain being almost of daily occurrence: another reason which will oblige us to return is to obtain provisions.

Our work hitherto may be summed up thus:—From the mouth of the Brass up to this spot a new and very accurate chart has been laid down, containing numerous corrections on those previously done, especially between the confluence and Rábba. The soundings taken have been very numerous, and we have examined many channels before untried, and our survey of any rocky passages has always been particularly careful. We have also ascertained the existence of six or seven tributary streams previously unknown, have ascended one of them, and hope to be able to examine others.

Our health continues fair; all, from frequent exposure, have had attacks of fever, but not of undue severity, and at this moment we are well. Of the ship's company I cannot say so much, illness

having been more rife among them and more troublesome in its effects, and I regret to say that among them one death has occurred.

We have now been 87 days in the river, and are, as far as the Government party is concerned, as ready for work as the day we left the sea: such points as require alteration I shall mention in a separate despatch.

This morning we felt it chilly, with the thermometer at 76°, though in the afternoon it will probably be close and roasting, with a heat of from 93° to 96° in the shade; two days ago the range extended from 72·5° to 98°, and in the sun ashore we have experienced it as high as 149°.

I have, &c.,

W. B. BAIKIE,

In charge of the Niger Expedition.

The Right Hon. the Earl of Clarendon.

Encampment near Jéba, 29th Oct. 1857.

MY LORD,—It is with much regret that I have to transmit to your Lordship information of the loss of the expedition steamer Dayspring, on a sunken rock near this place, on the forenoon of the 7th October. The Dayspring left Rábba on the afternoon of the 6th October, continuing her ascent the following morning, in the course of which she left the flat alluvial country which had long prevailed, and entered on a totally different region, the banks becoming stony, rocks showing in the river, and hills and mountains appearing ahead. About 10 o'clock we reached a place where a huge precipitous rock, some 250 feet high, divided the river into two nearly equal channels. We inquired of a man whom we had shipped as a pilot at Rábba which channel to take, and followed his advice; but on clearing this we found the river again divided into several passages, through the largest of which the water was rushing impetuously at a rate of about six knots. We accordingly anchored, and Lieutenant Glover went in the gig to sound and examine the river.

One channel, in which the current did not exceed five knots, and of a breadth of about sixty yards, was found to be free from rocks from side to side, and to have a depth of three fathoms. This we accordingly determined to try, some natives in a canoe alongside saying also that the passage was clear. In approaching it, however, we were obliged, on account of the direction of the current, to keep close to a rock on our left-hand side, on which, being caught by a

strong eddy, we were first thrown, but without receiving any damage.

On clearing this we entered the passage, where the current caught us on the port bow, driving us towards the opposite side, and making the vessel steer very badly; and scarcely had she commenced to obey the helm, which was hard a-starboard, than the current, now catching us on the quarter, and before we were quite clear, threw us with great violence on a sunken rock, jerking the leadsman overboard.

On our trying to get the vessel off, the after part remained fixed, while the steamer heeled over so much as to give us the idea that she was about to slip broadside off.

After the first excitement passed away, we all began to suffer from fatigue, exposure, and sleeping near the swamp, and we have all had attacks of fever more or less severe,—Lieutenant Glover, Mr. Davis, and myself, being the most sharply seized. My assistant, Mr. Dalton, who had been very ill previously, had a relapse of dysentery, and was very dangerously ill, but now, happily, all are either convalescent or well. Our canvas tent being extremely hot during the forenoon, the thermometer standing in it, when freely suspended, at from 95° to 99°·5 F., we got bamboos and mats from the natives, and constructed a more comfortable residence, about 40 feet long by 25 broad, and 16 feet high. Our encampment is the wonder of the natives, as we have cleared a considerable space of ground, have our tents well removed from each other, and keep the roads and ground clean. Taken altogether, it is a very good site, as, although we have a swamp not very far off, the wind never blows from that direction, and the health of all is improving.

I have sent to the king of Núfi to ask him for a couple of canoes to send a few of our most useless hands to the confluence, and at the same time to hurry up Mr. Laird's other steamer, which will be due in the river very shortly, and until she comes up we must content ourselves here, not having the means of transporting so many persons, and as I am also unwilling to risk their health so far. We have saved enough of damaged goods to enable us to buy provisions from the natives for some time to come; and, though we have neither salt meat, biscuit, sugar, coffee, cocoa, nor wine, and only a very small quantity of tea, flour, rice, salt, and rum, yet we procure daily fowls, yams, pumpkins, corn, and occasionally a goat or a little honey.

We managed to save almost the whole of the Government instruments, including all the chronometers, but most of our stationery is gone. Of our large botanical collection, Mr. Barter saved only a

part, and that damaged; but, by great exertion since, he has again put them into fair condition, and he is hard at work trying to replace his specimens as far as this neighbourhood will allow. I have especially to lament the destruction of a great part of Lieutenant Glover's surveying work, the portfolio containing which, after having been placed in what seemed a secure place on deck, was by the heeling of the ship thrown overboard and totally lost.

I have great satisfaction in being able to express my entire approbation of the conduct of the officers serving under me, both during and since the wreck.

I have, &c.,

WILLIAM B. BAIKIE,
In charge of the Niger Expedition.

The Right Hon. the Earl of Clarendon.

Clarence, Fernando Po, Nov. 24th, 1857.

MY LORD,—I have the honour to report to your Lordship my arrival at this place yesterday morning, per Mail S. S. Candace, from Lagos.

In pursuance of Dr. Baikie's instructions to me of the 31st October, 1857—a copy of which I have the honour to enclose—I left the encampment near Jéba, with two native attendants and messenger, about 3 P.M. of the same day, arriving at Fángan, a small town on the right bank of the Niger, situated midway between the encampment and Rábba, about 8 miles' distance from each, where I passed the night. At Fángan a small tributary, the "Osin," falls into the Niger, which I subsequently crossed, when but five hours' walk short of "Ilorin," where it was a river 30 yards broad, rapid, and just fordable for horses: it is not navigable for canoes from this point to the Niger in consequence of fallen trees and obstructing rocks.

On the following morning, Sunday, 1st November, I left Fángan, and walked continuously until past five in the evening, when I reached a town "Kpandáragi," where I rested for the night. The walk extended over 26 miles, during which we passed the three inconsiderable towns of Banyagífa, Koagír, and Gurúfu. Previously to reaching the first, the road had lain through almost continuous swamps, such as are common to the vicinity of the river at this season of high water.

After leaving it the roads improved, and we entered higher and drier country.

Leaving Kpandáragi the following morning (the 2nd instant),

three hours' walk brought me within the boundary of the Yóruba country, and at a very large and most important town, called Saré, when, after an interview with the chief, second in actual, but first in executive authority, whose title is Balogon, or war chief, I was furnished with comfortable quarters, and with what pleased me equally, assurances of their pleasure at my visit, and willingness to forward me on my journey. Saré is a large and important Yóruba town, several miles in circumference, and it was impossible for me either to attempt a measurement or obtain reliable information during the few hours I remained there. The inhabitants are Mohammedan, and up to the time of my visit the town was unvisited and almost unknown to Europeans.

Towards the close of the day I was summoned to a more social interview with the Balogon, at a large piazza full of inferior chiefs, when I enjoyed a very lengthened conversation, affording me an opportunity of publicly explaining the objects and intentions of white men in visiting their country, our arts and manufactures, our numerous useful discoveries, our sentiments upon the slave trade, our social laws and customs, and many other subjects, which were received and understood in a manner and to an extent which surprised me. The chief promised that a horse and a messenger should be both ready for me at an early hour in the morning.

Dr. Baikie could only furnish me with two inconsiderable presents for the chiefs at Ilorin; so that, on quitting Saré the following morning, I had nothing to offer but apologies and explanations, which were better received than I had a right to expect; and the Balogon having requested that a pair of pistols might be brought to him on my return, Consul Campbell at Lagos has undertaken to procure them if possible, and, if unable, to send him some other suitable present.

To-day's travel—the 3rd instant—was about 20 miles, terminating at half-past 5 at the town of "Osin," on the left bank of the tributary of that name previously mentioned, during which I passed two towns, "Akpádo" and "Kpáni," the road throughout lying either through well-wooded ridges or hills, or crossing numerous small streams; the ground in the higher parts strong and bad, with ironstone, granite, or a conglomerate of quartz and mica predominating, and in the lower parts level and sandy.

I left "Osin" before daylight on the morning of the 4th, passed the considerable towns Keyi and Okanshi, and, after with some difficulty crossing the Unyu and the Aza, two branches of a considerable tributary, said to fall into the Niger at Sángan, arrived at Ilorin at noon.

Ilorin, situated on a slope two or three miles south of the conspi-

cuous and isolated conical mountain of Sobi, is an independent town, and the stronghold of Mohammedanism in the Yóruba country. At 10 P.M. I was admitted to a private interview with the Balogon,—my attendant interpreter, Asímo Záki's messenger, he, and myself alone being present, and the piazza kept quite dark, excepting a dull light thrown only on the mat on which I sat. I fully explained my objects, wishes, and intentions, as instructed by Dr. Baikie. My reception was everything I could have wished, and I was to be presented to the king on the next day. The following day was one of vexatious delay to me; the king was too busy to see me; and, until a stranger has seen him, he is a prisoner, not being permitted to go beyond the premises allotted to him.

On the 6th I was received by the king, chiefs, and head men, with much formality. The king himself I never saw: a moving mass of silk and satin on similar cushions, at a hole in the wall, nearer to which than several yards I was not allowed to approach, was nevertheless him. As it had been hinted to me that the presents were paltry, I took this opportunity of explaining the circumstances of our inability to offer more suitable ones. About five months previous to my visit a party of three American missionaries had visited Ilorin, only one of whom saw the king, and no permission could be obtained to proceed beyond into Núfi. The king told me of this visit, and, on asking me if they were friends of mine, I took the opportunity of more fully introducing myself as a messenger from the British Government, sent to assure Africans of our desire to know and befriend them, to supply them with those things which we possess and which they so much covet, of our need of those things which their country so plentifully produces, pointed out our abhorrence of slavery, and to the utmost of my ability dilated upon those matters which I conceived our duty as Englishmen and Christians points out to us, and which are quite in accordance with the wishes of your Lordship and Her Majesty's Government in creating this expedition. The king made me a present of a sheep and several thousand cowries, and, after repeated expressions of satisfaction at my visit, my objects, my explanations, &c., the ceremonious and public interview ended.

I was now at liberty to move about the town, but my anxiety to forward arrangements for my departure prevented me entirely availing myself of it. The population of these large towns in Yóruba is by no means to be estimated from the extent of ground on which they stand; they are invariably walled and ditched, and within, though clusters of compounds or series of dwellings are numerous, much the most considerable space is occupied by isolated ones, situated in plots about as extensive as one of the smaller

metropolitan parks. The estimation I obtained from some of the principal men as to the circumference of Ilorin was between "five days' walk" and "five days' hard riding with a very fast horse." I now sought an early interview with the Balogon, obtained from him the mails, which were left at Ilorin nearly a month previously, and pressed upon him my speedy departure. He assured me of his intention of looking for a horse for me "to-morrow," so that I might start the next day. He strongly impressed upon me his great desire to have a tent or some canvas to make a house for his use on war expeditions, which I have strongly recommended to Dr. Baikie.

About 4 P.M. on Sunday, 8th November, 1857, provided with a tolerable horse and two messengers in addition to my own party, I left Ilorin, having at the last moment, at the request of the Balogon, illustrated the advantages and effects of my five-barrelled revolver, which filled him and the crowd with astonishment and delight, and of course elicited the request that when I came back I would bring one similar for him.

The invariable mode of travelling between Ilorin and Ogbómosho (Ibomasha), my next town, is to leave the former at this hour, reaching a farm or small village just before dark. Here I learnt that my horse could not be permitted to pass without a special messenger from the king authorising it. Whilst hundreds were setting out the next morning on the long day's journey to Ogbómosho, I was thus detained until noon, and by 7 P.M. had not reached my destination, and was compelled to halt in the bush. A ludicrous instance of African hospitality which occurred to me here will more clearly show the kindly feelings of the people of this country than I should be able to explain. After settling ourselves on the roadside under some trees, our voices attracted the attention of a farmer and his family in the vicinity, who, approaching us and discovering who we were, soon offered us such accommodation as the farmhouse a little way off afforded. We accepted, and, after a tedious walk, arrived at it, and were furnished with a mat, and afterwards with a portion of food, by which time I discovered that the ground was still to be our couch and the sky our canopy, as the hut was no larger than necessary for their own accommodation. At 4 A.M. on the morning of the 10th I left this hospitable abode, and, after meeting a fresh horse and messengers sent to me by Mr. Clarke, the resident American missionary, arrived soon after 6 at Ogbómosho.

Accompanied by my messengers, I soon sought an official interview with the chief, was introduced, and repeated my explanations, &c., and after a friendly reception was promised an answer "to-morrow." Mr. Bowen, an American Baptist missionary, who after very many obstacles penetrated to this place and established a mis-

sion, has returned to the United States, and published a work containing a much more detailed account of this place, and the country between it and Abbeokuta, than my hasty journey could possibly afford me the opportunity of doing. On the following day a message reached me from the king that a horse would be ready for me; but on subsequently visiting him to bid him "good bye," I learnt that a horse could not be provided, but that I should have some men to carry me in a hammock.

It affords me great pleasure to mention the kind assistance I experienced at the hands of the Rev. Mr. Clarke, who, in addition to his hospitality to myself, furnished me with a supply of stores, of which Dr. Baikie and party stood in great need, and which I forwarded to them.

It was noon of the 12th when I left the south gate of Ogbómosho, accompanied by carriers, messengers, and suite, and arrived at 3 P.M. at a halting-place, where our party wished to stop for the night, as the next could not be reached before dark. I was by this time growing alarmed at the prospect of missing the mail steamer due at Lagos on the 20th, and would not hear of this delay. I then moved the party on, much against their will, accomplished a good deal of our journey in the cooler part of the day, and halted at dark in the bush for the night. On the morning of the 13th we started again at 5·30, and at 7 crossed the "Obba" river, which was then fordable; and after a toilsome journey, sometimes walking and sometimes being carried, arrived at the north gate of "Awyaw" at noon.

"Awyaw" (Aggo Oja), the capital of Yóruba, ranks, however, in point of size only in the second class, with Ogbómosho and Ijaye, &c., and is the least interesting town I passed through. Perceiving that the interval between this and the 20th would not admit of such delays as I had been subjected to, I determined, if necessary, to decline the aid and cognizance of chiefs from this point. I speedily had an interview with the chief, who, it appears, is privileged to receive white men, and made the usual explanations to him, coupled, however, with an intimation that, although I much desired such assistance as I had received at other towns, I could not possibly prolong my stay beyond next day morning. This chief was very civil to me, and my story, &c., was duly carried to the king, who sent to tell me that he had looked for a horse for me, but had failed to find one, and that he could not procure men to carry me. There are no resident European missionaries at "Awyaw," but a native convert is usefully engaged there on behalf of the Church Missionary Society.

At 9 A.M. on the 14th instant, having taken leave of the chief to

whom I had been introduced, and by whom I had been provided with a house, &c., I left "Awyaw," he having explained to me that there was no impediment to my doing so on the king's part, since, indeed, it was quite customary for white men to come and go as they chose. An hour's walk brought me to a small town, "Ilara," and at half-past one I reached a still smaller one, "Iron." After a farther walk for about two hours I was fortunately met by a horse sent from the Church Missionary Catechists in charge at "Ijaye," arrangements which I had made to that effect having succeeded; and by this means I was enabled to reach the Church Missionary premises in that place after five in the evening. This is the station of the Rev. Mr. Mann, of that Society, who, however, was now in Europe: there is here also an American Baptist Mission. My two attendants being much fatigued, I resolved to wait at this place the following day (Sunday, 15th). From "Ijaye" to "Abbeokuta" the journey may be performed in three ordinary days, or, by a new road recently formed, in two days' long journey. I adopted the latter, and provided, by the kindness of Mr. Phillips, with a pony, I set out on the morning of the 16th of November, and reached a halting-place about 9 miles from this point. The nature of the country through which I travelled completely changed: whereas before it had been by tolerable roads, through fine, open, cultivated, or lightly wooded and park-looking country, with views in every direction for miles, I now entered upon a wretched road, extending for many miles through sombre forests, and with a view never extending beyond the trees immediately lining the road, or the grass, 20 feet in height, touching me on each side. After noon we halted on the site of an old town, "Ido," clearly traceable by pottery or vestiges of walls, &c.—one of the numerous examples there are to be seen of the effects of the wars which desolated Yóruba not many years since. At 5 P.M. our day's journey ended by our arriving at a small town called "Ilirgun," which is indeed nothing but a resting-place, with houses of temporary and rude construction for the shelter of travellers, but was once a large and flourishing town. Its re-establishment is however anticipated, aided by the importance attaching to it since the new route has passed through it. I left Ilirgun at an early hour on the following morning (17th November, 1857), prepared for the longer of the two long days' journey, and arrived, after continuous travel, at "Atade," a very small town, about four hours' journey from Abbeokuta. My two attendants, who latterly failed much in their walking, more perhaps in consequence of their being unaccustomed to it, and the roads growing worse, than from actual fatigue (for our intervals of rest were frequent, and sometimes, as at Ilorin, much too long),

now complained very much, and the consequences were that a four hours' journey occupied just six, so that it was 6 P.M. when I arrived at Abbeokuta at the Church Missionary premises, and was most hospitably received by the Rev. Henry Townsend. I had proposed, and, on its being recommended, determined to pursue my journey hence per canoe down the "Ogun" to Lagos (a two days' journey), although there is a land route which occupies but a little more time, and is, of course, more used coming up. Four P.M. of the following day (10th) being selected as a judicious hour for my departure, I had opportunity in the interval of paying a visit to the chief of this considerable place. At 4 P.M. of the 18th I embarked in a canoe at Abbeokuta, it having been distinctly arranged with its proprietor and paddlers that they were to travel all night, and not stop until reaching Lagos. In spite of this, however, three separate times during the night they stopped and made the canoe fast, and it was only by exercising something stronger than eloquence that I could get them to proceed. Indeed, on the third occasion I left them on the shore, and proceeded without them down the river, which had the effect of bringing them in haste after me, and prevented future attempts to delay. After journeying in this way thirty-seven hours, which would have been unpleasant but that the rest it afforded was much relished by all of us, I arrived at Lagos on the morning of the 20th instant, and was kindly received by Mr. Consul Campbell. Four hours afterwards the mail steamship Candace from England arrived in sight, thus showing that my haste had been far from unnecessary.

Thus, accompanied by two native attendants, I have accomplished the journey from Dr. Baikie's encampment on the Niger to the sea at Lagos in twenty days, having travelled over near 300 miles of country, sometimes on foot, sometimes on horseback, opening up the part of that route which has hitherto proved inaccessible to Europeans through the jealousy and caution of the rulers at Ilorin.

From the river to Abbeokuta certainly three-quarters of the whole country through which I passed was under cultivation, corn being the almost invariable article cultivated, which forms the staple, and, with yams, the sole food of the people. The grain was of three kinds—common Indian corn, and the two sorts known to us as "Dawa" and "Goro." Nor was this the only evidence of the industry of this country, as everywhere cotton spinning and weaving are carried on. Yóruba is famous for its cloths. The iron-smelting and pottery works are by no means despicable, and other useful employments are to be witnessed; whilst from town to town for many miles, and particularly to and from "Saré," the entire road presents a continuous file of men, women, and children,

carrying articles of their production for barter or sale. Palm-oil and cotton, of course, find their way to the sea, and will serve to account for the peculiarly brightening prospects recently observable in the trade in the latter article at Abbeokuta and Lagos.

Being unprovided with a barometer, I was unable to make observations on the various elevations, but on leaving the river we speedily gained high ground, and continued to do so until reaching Ogbómosho, which I place as the culminating point. From it to Abbeokuta there is a descent. At this point we reach the delta of the Ogun.

I was furnished with three pocket-chronometers, one of which stopped on the day of my departure, and, as I soon discovered, repeated the same whenever I attempted to carry it in my belt; but with the other two, and the various astronomical observations I have made, I hope to produce an amended chart of this part of Yóruba.

Throughout the entire route I have experienced the utmost civility and often kindness from every native. To the Rev. Mr. Townsend, of the Church Missionary Society at Abbeokuta, I am much indebted for his kindness and assistance.

On my arrival at Lagos I ascertained that Mr. Laird's expected second steamer was preparing for her voyage at the time of the departure of the Candace from England, and might in two or three weeks be expected on the coast. In accordance, therefore, with Dr. Baikie's instructions, I left my two attendants in the care of Consul Campbell, to return on the 23rd instant, carrying the despatches for Dr. Baikie, which were received from the Fernando Po mail-bag in the Candace, together with various small supplies for Dr. Baikie, and a few small presents, &c. The mails and a tracing of Lieutenant Glover's charts of the river I duly delivered to Mr. Campbell for transmission to your Lordship's office, and, taking a passage in the Candace, arrived at this place as before-mentioned.

I am at present the guest of Governor Lynslager, on whose zealous assistance, coupled with that of Consul Hutchingson, I may safely rely in facilitating the departure at least of the Sunbeam from this place for the river.

Trusting that my manner of carrying out the business intrusted to me by Dr. Baikie, as well as the various opinions I have ventured to express in this despatch, may meet your Lordship's approval,

I have the honour to be, &c.,

DANIEL J. MAY, R.N.

The Right Hon. the Earl of Clarendon.

Extract of Dr. BAIKIE'S *Despatch to the* Earl of CLARENDON.
Dated December 12, 1857.

"I have much pleasure in recording the proceedings of my own party. In a few days I shall expect to see Mr. May on his return from Lagos, after having successfully opened and restored the route from this to the sea. Lieutenant Glover, with another party, has ascended the river from this spot by boat, and having gone some distance beyond that reached by the late Mr. Beecroft, and having passed the so-called 'Iron Gates,' he at length reached a spot, at a Núfi town named Wúru, where, from the very rocky nature of the channel and the extreme force and rapidity of the current, all passage, either by boat or canoe, was impracticable. There he landed on the right bank, in the kingdom of Borgu, and proceeded by land by special invitation to the large town of Wáwa, where were waiting messengers from the important town of Busa, to which place he will next direct his steps. I heard from him two days ago, reporting his progress and asking for further supplies, his letter being dated the 7th inst., a day's journey from Wáwa; and before his return, which will probably be towards the end of the month, I hope he will have done much towards exploring a rich and little known country, and in which he and his people have been most kindly received."

The PRESIDENT.—The Society will be happy to learn that the Admiralty have at once ordered out the Sunbeam, Mr. M. Laird's new vessel, to proceed to the Niger and relieve the expedition.

DR. MCWILLIAM, M.D.—I must express my admiration at the perseverance and industry with which Dr. Baikie has so far accomplished his mission. It is very much to be regretted that, after getting above Rábba, and escaping many difficulties, the vessel was lost. It evidently got upon one of those rocks where, about twenty miles farther up, the illustrious traveller Mungo Park lost his life. The former expedition by Dr. Baikie, and this expedition, redound very much to his honour, and I shall augur very favourably of any further effort he may make in the Sunbeam. I know Dr. Baikie well, and I have great confidence in his abilities, skill, and zeal.

The only improvement is the more liberal administration of quinine, which may do much, both as regards the prevention and treatment of the African fever; but the main secret in such an enterprise is, I imagine, to employ native agency as much as possible, to have a vessel with ample room, to avoid crowding Europeans together, and to pass as rapidly as practicable through the delta. In the expedition of Captain Trotter, of which I was principal medical officer, out of 132 blacks 11 only were attacked by fever, and none died. Those attacked had all for some years been in England—a fact tending to show that the immunity from endemic disease in warm countries which is enjoyed by the dark races is, to a certain extent, destroyed by a temporary residence in another climate. Of 108 negroes entered at Sierra Leone not one was attacked.

DR. BARTH, F.R.G.S.—It is an important circumstance that Rábba has always been a great centre of intercourse for the whole commerce of the Niger and the country to the east and west. In the time of the expedition of Captain Clapperton the province of Núpe or Nyffi was in a turbulent state, and the gallant traveller had great difficulty in traversing it in his journey to Sókotu. 'Othmán Záki, the former governor of that province, was living in retirement in the Birnin Kebbi at the time of my journey, and behaved very friendly towards me. Now that that governor has returned from his exile, and intends to rebuild Rábba, it is to be hoped that Dr. Baikie will find the country in a better state, and that intercourse with the whole region may be now fairly established. It must, however, be borne in mind, that the Director of the Niger Expedition has to deal with two different chiefs, namely, that of Sókotu, and the other, almost equally powerful, who resides in Gando, four days south-west of the former, and to whom the provinces on the Niger especially belong. Even if Dr. Baikie had not lost the Dayspring, he would not have been able to get to Sókotu at the time, because the whole country between the Niger and Sókotu is quite impassable in September and October; so that if he is able to resume his journey now, he will only have lost two months, as he could not have gone on before November. It is certainly unfavourable that he should have lost the whole of his presents, for without presents he will find a difficulty in proceeding into the interior, and those chiefs always want some presents, especially the people composing the court of Sókotu and Wurno; but it is very favourable in this respect, that some presents have been forwarded by the Earl of Clarendon to 'Alíyu, the present Emeer el Múmeneen, who resides at Wurno, along the northern route, by way of Tripoli and the country of the Tawárek.

CAPTAIN WILLIAM ALLEN, R.N., F.R.G.S.—It is twenty-five years since I was in that part of the Niger alluded to. In the survey which I made of the river I was totally unaided, and it was, no doubt, imperfect; nevertheless, I may say that the succeeding expedition under Captain Trotter was safely guided by it. Subsequent surveys have been made with better means and opportunities, therefore I cannot add any information on the subject; but I am glad to find that the results of the recent ascents of the river have confirmed my original suggestion that the rainy season is the most favourable for navigating the Niger, that is to say, the latter end of June or the first week of July. The river is then beginning to rise; the dangers, especially the rocks, can be seen and avoided; and in the event of a vessel grounding on a sand-bank, the swelling flood would soon lift her off. The climate is then more healthy, as the remains of decayed vegetable matter have been dissipated in the dry season. The two first expeditions were delayed by various causes, and could not enter the river until near the time of the periodical inundation, which is the main cause of its unhealthiness. On both occasions our crews were attacked by fevers on passing the delta. In the second season of Lander's Expedition, 1833, we left Rábba at this time, namely, when the river was full and had begun to fall. This was precisely the time, to a day, that Dr. Baikie attempted to pass the rapids above that city, when the rocks were covered, the channel concealed, and the current was running with the greatest rapidity.

Captain Beecroft, in the Ethiope steamer, tried this passage at a similar time, and found the current so strong that, although perhaps going at a greater speed, the vessel made no progress. The reason was, that she was opposed to an inclined plane, up which the paddles had not power to lift her: they only made their revolutions *through* the water. I fear this rapid will be found to be an impassable barrier.

In the Admiralty chart of Dr. Baikie's explorations, now exhibited to the Society, I observe a river was explored, the mouth of which I passed and laid

down in my survey. It was called the Kudunia by Lander, and appears to come from the mountains to the north-east of Kattam Karafi. It may be one of the streams crossed by that enterprising traveller on his way from Zegzeg to Jacoba, when he was carried back, and obliged to return to the sea at Badagry, by his former route with Captain Clapperton, R.N.

MR. GALTON, F.R.G.S.—Does Captain Allen corroborate the remark of Dr. Baikie as to the great improvement in the type of the African as you go inland?

CAPTAIN ALLEN.—I cannot say that I found much physical improvement, though, in civilization, the tribes on the coast are far surpassed by those of the interior. I met with two remarkable instances of tact and courtesy: one was the king of the Filalahs at Rábba; the other a judge at the town of Iddah; neither of them had seen white men before. Nevertheless, in other parts inland I found tribes in a very low condition.

The PRESIDENT.—Before I quit the subject of Africa, I beg to call attention to the sketch on the wall, made by Mr. Baines, the artist to the expedition, of the steam launch in course of construction for Dr. Livingstone's expedition up the Zambesi. As I see Captain Bedingfeld present, who is to command the launch, we shall be glad to hear what he thinks about her.

CAPTAIN BEDINGFELD, F.R.G.S.—I am sorry that I can say very little about the launch at present, for I have not seen her. I am afraid that her length will be a great inconvenience to us. She is eighty feet long and only eight feet beam, and in that picture the house appears rather high for a puff of wind. I believe she is in three pieces, and I hope we shall be able to put the two ends together if we find her too long. However, when we are left to our own resources, I dare say we shall get her up the river in some way or other.

MR. MONTGOMERY MARTIN, F.R.G.S.—With regard to this expedition, or that to the Zambesi River, I venture to observe, that I have visited the Zambesi and all the Portuguese settlements on the eastern coast of Africa. The experience I had of the Portuguese settlements induces me to think it of the highest importance to get the practical co-operation of the Portuguese Government in this most important expedition, which is viewed with deep interest by the Christian and commercial, as well as by the scientific world. It appears to me that nothing should be left undone to secure the efficient and complete exploration of the country by Dr. Livingstone and his small band of brave and devoted companions, who, both on the east and on the west coast, will have to traverse Portuguese territories. It does seem to me advisable that the Council of the Geographical Society should request our Government to ask the King of Portugal, who is known to be an enlightened sovereign, whether one or two scientific gentlemen might not be disposed to accompany this expedition? Dr. Livingstone is himself the best judge whether such a proposal be worthy of consideration, and I venture to think it would be acceptable to this large assembly to hear his observations upon it.

DR. LIVINGSTONE, F.R.G.S.—There may be some difficulty in getting members of different nations to act in concert who do not understand each other's language. We shall find sufficient difficulty with the natives with whom we shall come in contact. The Pasha of Egypt acted upon the principle suggested, to a great extent, and spent about 20,000*l.* in sending a number of men of different nations on an expedition up the Nile to discover the sources of that river. Before they got above the first cataract they, however, got to loggerheads, and the only man who passed the cataract was an Englishman—young Twyford, a Fellow of this Society. If we may take warning by this example, I think it is not advisable to join the members of different nations together in one expedition. There is another thing to be borne in mind. We are Englishmen, and we do not like slaves. All the Portuguese out in that country are in the habit of using slaves. I would not like to have slaves in my party. I like to go and be able to say to the natives—"You see my men—they are

all free men; we have no chains amongst us. We are free men, and want you to give up the slave-trade." Now, although the Government of Portugal is very anxious to get slavery abolished, yet their officials out there may not have the same enlightened views. I have the fullest confidence in the King of Portugal, and that he would do anything in his power to put an end to slavery in all his dominions. Very excellent laws are made, but as soon as they get out there they are entirely inefficient. That is the case in a great many other instances. Take the carrier-system, for instance, in Angola. One law after another has been passed in Portugal putting an end to this system in Angola, but it goes on all the same as ever it did. I think it would be best for the success of the expedition to have it as simple as possible, and as few men in it as possible. If we have a great number of men we shall have a great number of tempers, and we are none of us perfect. A few men can always get on very much better than a large body of men. There are other considerations that induce me to think it would be better to have a limited party. This is a tentative expedition, sent out to get certain information. I came out of that country alone. I stated the impressions that were made upon my mind by what I saw. But before any decided action has taken place I should like to gain fuller information about the country. On that account I propose to take a practical mining geologist, who will be able to give a clear idea of the mineral resources of the country. I want, too, a practical botanist, not one who will run about after a new species of cryptogamia and things that we do not care to know about, but a man who is acquainted with the medicinal properties of plants. Several medicines go from the east of Africa to Bombay, and are thence brought in that roundabout way to England. I want a man who knows the medicines we now use, to see if they are to be found in that country, who understands about different fibrous substances used in commerce, and also the different dye-stuffs. I want this man to give a full account of the resources of the country. Then, if any action is taken, let it be taken on the full report of these scientific men. I think the men we now have will form a very compact body, and I hope we shall all keep our tempers, and come back with some valuable information.

The PRESIDENT.—Dr. Livingstone has very well explained the reasons for not having a mixed expedition, but has omitted to state that the British Government has decided that no person should be attached to the expedition but those with special scientific vocations. If three or more Portuguese gentlemen with their servants were to be added, all talking a separate language, the expedition would be much hampered.

MR. MONTGOMERY MARTIN.—Has the sanction of the Portuguese Government been obtained to the expedition? because we shall have to go through their territory.

The PRESIDENT.—The communications of the Portuguese Government have been of the most friendly nature; and through their minister here, the Count de Lavradio, who has already shown deep sympathy and interest in the cause, they have expressed their earnest desire to assist Dr. Livingstone. I may add, that Dr. Livingstone intended to visit Lisbon, notwithstanding the prevalence of the yellow fever, but that our Government restrained him on account of the risk to his own valuable life; and even now, if the expedition be fitted out in time, Dr. Livingstone would willingly proceed by Lisbon, in order to wait upon the King, and show the perfect amity and good feeling that exists between the two governments in relation to this exploring journey.

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The second Paper read was:—

2. *On Mounts Everest and Deodanga.* By Lieutenant-Colonel ANDREW SCOTT WAUGH, F.R.G.S., &c., (*Gold Medallist*, R.G.S.)

Communicated by Col. W. H. SYKES, M.P., V.P.R.G.S., &c.

Surveyor-General's Field Office, Dhera Dhún,
5th August, 1857.

MY DEAR THUILLIER,—In my letter No. 29, of 1st March, 1856, communicating the results of our calculations for the position and height of No. XV. in my list of Himalayan peaks, I stated my reasons for deciding to call this peak "Mount Everest."

At the August meeting, last year, of the Asiatic Society of Bengal, you were good enough to communicate the results regarding "Mount Everest" in an interesting address delivered by yourself. The facts having been thus promulgated, Mr. Hodgson endeavoured, in the Journal of the Asiatic Society, to establish the identity of Mount Everest with Deodanga, &c. The arguments adduced for this purpose were so palpably conjectural, resting on hearsay evidence alone, that I thought it needless to refute them, as their fallacious character was apparent to any person competent to understand the subject. The true geographical latitude and longitude of Deodanga are unknown to Mr. Hodgson, or even its true bearing and distance from any locality which can be recognised as a fixed point of departure. Its height also is unknown. All these data are elements necessary to the identification of that mountain. The physiognomical contour of a mountain is a very uncertain test, because it changes with every mutation of aspect; but even this test is wanting in Mr. Hodgson's case, as he has never seen Deodanga.

In April last my attention was drawn to another communication made by Mr. Hodgson to the Asiatic Society, from which it appears that he has taken steps to put the subject in what appears to me a very unfair light before the Royal Asiatic Society, as well as to have his conclusions on a point of great ambiguity promulgated as certainties in journals of extensive circulation: under these circumstances I considered that it would be satisfactory to scientific men that the grounds on which the supposed identity of Deodanga was made to rest should be examined and discussed. In my judgment the only proper way of doing this is to lay the whole of the documentary materials before a Geographical Committee composed of geometricians of experience and capacity, competent to deal with such investigations; with this view I issued the Departmental Orders annexed.

Of the five officers to whom this duty was assigned, four have now delivered their reports; the fifth, Lieutenant Montgomerie of the Engineers, is at present difficult to communicate with, being absent

in Thibet conducting the General Trigonometrical Survey operations beyond Kashmir. That officer's opinion will be very valuable, and (D. V.) shall be transmitted hereafter; in the mean time, encompassed as we are by the confusion and embarrassments attending a military rebellion of unprecedented magnitude, I am unwilling to delay the transmission of the four reports hereto annexed; these are so ably argued, and place the subject in so luminous a point of view, that it is unnecessary for me to add more than a few words in this place.

Mr. Hodgson labours under a strong conviction that Mount Everest is identical with Deodanga; and the ingenuity with which he advocates his view of the question seems to have carried the same conviction to the minds of others not conversant with the facts. It is easy to see how this fallacy originated in his mind. The Sketch Map published by him in the Journal of the Asiatic Society, December 1848, gives his idea of the configuration of that part of the Himalayas; a more erroneous impression of the formation of the country was never formed; he represents a solitary mountain occupying a vast tract. If this unity really existed, the identity of Mount Everest and Deodanga would indeed be indisputable, as it would rest in the fact of there being only one mountain within a given space; this single mountain, however, is entirely imaginary. The range presents the appearance of a "sierra" with innumerable peaks and groups of peaks. Among these nine have been fixed by the General Trigonometrical Survey of India, and are marked XII to XXI in the chart accompanying Mr. Scott's report. Besides these nine, several others are more or less partially visible, which we were unable to identify; and those who have any experience in conducting geodetical operations in the Himalayas can harbour no doubt that many other peaks do exist which have been concealed from our view by intermediate ranges. It is well known to surveyors that among a number of peaks having various altitudes and distances, the highest point in appearance is not always the highest in reality, the ocular deception being caused by the increment in the earth's curvature and decrement in the subtended angle caused by distance.

The erroneous idea Mr. Hodgson has formed of the configuration of this mountain range is sufficiently proved by his sketch map already referred to. If further proof were necessary, it may be derived from the statement Mr. Hodgson has given of the opinion he communicated to me when I returned from the expedition I made into Sikim in 1847. Having mentioned to him that I had seen from the confines of that province an enormous snow-mass lying in a north-westerly direction from Tonglo, he immediately pronounced it to be "Deodanga." Now the mountain I then saw was not Mount Everest, but No. XIII, which Major Sherwill has so well described

in the Asiatic Journal. Thus Mr. Hodgson has attributed the same name to No. XIII and to No. XV, without any exact knowledge of the height or position of either. He has fallen into this mistake from adopting the erroneous conception that there is only a single mountain in all this wide space.

Mr. Hodgson proves no more than that there is, according to native report, a mountain called Deodanga somewhere between our Nos. XI and XXI (vide chart). That mountain may be one of the peaks fixed by us, or it may be one that we failed to fix, or it may not have been visible to us at all. If Deodanga is to be taken as the highest peak, that allegation only rests on the hearsay evidence of natives unable to determine the actual height of a mountain; and if it be a true guess on their part, it by no means establishes the identity of Deodanga, because we do not know for certain that Mount Everest is the highest culminating point; all we do know is, that it is the highest point we have measured.

The only satisfactory way in which the position of Deodanga can be determined is by carrying up a series of triangles towards it until it can be seen and identified; operations of this kind are impracticable at present for political reasons. In the mean time the position and height of Deodanga constitute a geographical problem remaining to be solved. If it is not identical with Mount Everest, a very grave blunder would be committed by assigning its name to another peak; if it is identical, no harm will have been done by the adoption of another cognomen pending the doubt now existing.

Great stress has been laid in some quarters on the fact that the position of Deodanga is given in German Maps; now this proves no more than that German geographers are rash enough to lay down anything upon hearsay; for we know beyond all question that no competent European with adequate means has ever been in the vicinity of Deodanga so as to be able to fix it. Deodanga does not appear in English maps, because it would be inconsistent with the rigorous notions which prevail among English scientific men in general to pretend to give the position of a point on the earth's surface on hearsay evidence. It would violate every principle of accuracy and precision laid down by my predecessor for the conduct of the Trigonometrical Survey of India to jump at conclusions in this reckless manner.

As the principle of adopting an European name has been much commented upon, I will here add without further remark paragraphs 6 and 7 of my letter to your address cited at the commencement of this letter.

"I was taught by my respected chief and predecessor, Colonel George Everest, to assign to every geographical object its true local

or native appellation, and I have always scrupulously adhered to this rule, as I have in fact to all other principles laid down by that eminent geodist.

"But here is a mountain, most probably the highest in the world, without any local name that we can discover, whose native appellation, if it has any, will not very likely be ascertained until we are allowed to penetrate into Nepal."

In conclusion, as the Asiatic Society has inserted in its Journal papers tending to mislead in regard to the identity of Deodanga and Mount Everest, I trust that they will give prominence to this discussion, which proves that the fact is not only doubtful, but far from probable, if the particulars supplied by Mr. Hodgson are correct so far as they go. Considering it a matter of importance that geographers should be enabled to form their own opinion on the subject, I request you will communicate this correspondence with its annexures to the Asiatic Society, retaining a copy for record.

I remain, my dear THUILLIER,

Your affectionate friend,

(Signed) A. S. WAUGH.

P.S. You will perceive the gist of the question is not whether the mountain should be called Mount Everest or by its true native name (which is a principle not disputed by any one), but whether it can be called Deodanga without risk of error, in the absence of satisfactory proof that this is really its native name.

No. 10,267.—DEPARTMENT ORDERS.

Surveyor-General's Field Office, Dhera Dhún,
22nd April, 1857.

THE attention of the Surveyor-General of India having been drawn to the Proceedings of the Asiatic Society (as marginally cited),* it appears to him desirable that the question which has been raised as

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* From Mr. B. H. Hodgson, submitting for the information of the Society and the public in general the following extract of a letter from the Secretary to the Royal Asiatic Society, in reference to the mountain "Deodanga" ("Mount Everest") of Colonel Waugh:—

"Your letter of the 27th October, together with your observation on the incongruity of assigning a European name to Indian localities already provided with native appellations, was received and read at our last meeting of the 17th inst.; and I have the pleasure to inform you that the members present unanimously expressed their concurrence with your view of the case.

"A notice of the paper was communicated to the Athenæum and Literary Gazette, and has appeared already in full in the latter journal. I have, &c.,

(Signed) "EDWARD NORRIS, Sec. Royal A.S.

"*To B. H. Hodgson, Esq.*"

respects the identity of "Mount Everest" with "Deodanga" should be examined by a competent Geographical Committee in order to set that point at rest.

The Surveyor-General has carefully examined all that Mr. B. H. Hodgson has advanced in support of the identity of Mount Everest with Deodanga, and has formed his own opinion on the subject; but he thinks it will be desirable that the question should also be formally investigated by a committee, and the opinion thereof placed on record for general satisfaction.

The Committee will be composed as follows:—

Lieut. TENNANT, Engineers, 1st Assistant G. T. Survey. In charge Jogi Tila Series.
Lieut. MONTGOMERIE, Engineers, 1st Assistant G. T. Survey. In charge Kashmir Series.
J. HENNESSEY, Esq., 2nd Assistant. In charge of Geodetic Computations at Trigonometrical Survey, Head Quarters.
W. SCOTT, Esq., Chief Draughtsman in the Field Surveyor-General's Office.
J. W. ARMSTRONG, Esq., Civil Assistant G. T. Survey, &c.

The papers connected with Mount Everest, and Mr. Hodgson's alleged identification thereof with Deodanga, are at present under charge of Mr. W. Scott, who has spent a quarter of a century in unravelling more intricate geographical problems than this. Mr. Scott will form his own independent opinion and submit the same to the Surveyor-General, after which he will forward the papers to Mr. Hennessey.

Mr. Hennessey has been engaged on all the computations for determining the positions and heights of the principal peaks of the Himalaya range, including Mount Everest, and is well acquainted with investigations of this kind. He also saw Mount Everest when he was engaged on the north-east longitudinal series. After submitting his independent opinion to the Surveyor-General, he will forward the papers to Mr. J. W. Armstrong.

Mr. Armstrong is one of the gentlemen by whom Mount Everest was observed. He will forward his opinion to the Surveyor-General, and the papers to Lieutenant Tennant, by whom they will be independently received, thus giving the investigation the benefit of his eminent abilities in matters of difficult research.

From Lieutenant Tennant the papers will proceed to Lieutenant Montgomerie in Kashmir, whose recent experience in details of Himalayan geography will enable him to pronounce on this question a valuable independent opinion, which he will transmit with all the papers to the Surveyor-General.

(Signed) A. S. WAUGH, Lieutenant-Colonel,
Surveyor-General of India.

Memorandum by MR. W. H. SCOTT, *Chief Draughtsman in the Field Surveyor-General's Office.*

WITH reference to Department Orders No. 10,267, dated 22nd April, 1857, in which I am called upon to state my independent opinion on the identity of Mount Everest with Deodanga or Bhairavathan, I beg leave to report, for the information of the Surveyor-General of India, as follows:—

After a very careful examination of the papers specified in the margin,* I am humbly of opinion that there is no evidence to establish satisfactorily the identity of Mount Everest with Deodanga or Bhairavathan.

The routes of the two Nepalese embassies, from Katmandu to Pekin, no doubt contain much interesting detail; but unfortunately they do not assist us in the present investigation, because the azimuths or bearings, it will be seen, are not given, and consequently we can bring them to no account. It is essentially necessary that the position of Kutighat, or Bhairava Langur, should be known with some degree of certainty; but this we are unable to do by the aid of the papers in question, as will be apparent to all familiar with the subject. All the maps I have consulted only tend, in my humble opinion, to confuse and mislead: for instance, the direct distance of Kuti from Katmandu, according to Kirkpatrick's map, is only 48 miles, 88° N.E.; Walker's engraved map gives 63·6 miles, N. 60° E.; Parbury and Allen's, 60 miles, N. 55° E.; according to Crawford, 75 miles, 75° N.E.; Arrowsmith's map, 56·6 miles, N. 78° E.; according to the preliminary sketch map, compiled at the Surveyor-General's Office, Calcutta, 72·6 miles, N. 53° E.; according to the route of Kaji Dalbanjan Pande the distance is 101·5 miles. The Chountra omits Kuti altogether. Amidst these conflicting values it is of course impossible to arrive at any satisfactory conclusion. The following extract from a letter from Major Ramsay, Resident of Nepal, to Major Thuillier, regarding the compilation map of that country, dated 11th June, 1855, will serve to convey an idea of the conjectural materials and discordant elements we have to deal with:—"You are doubtless aware that no European has ever travelled in the interior of this country, and that

* Mr. Hodgson's letter on the Native Name of Mount Everest, J. A. S., No. 5, 1856. The papers referred to in that communication, and published in J. A. S. No. 6, 1856, are,—1st. Route of two Nepalese Embassies to Pekin, with Remarks on the Waterparting and Plateau of Thibet. 2nd. Systematic Summary of the Route from Katmandu to Pekin, by Kaji Dalbanjan Pande, 1822-23. 3rd. Abstract of Diary from Katmandu to Pekin, by Chountra Pushiker Shah, 1817. 4th. Memorandum on the Seven Cosis, with Sketch Map, J. A. S., 1848.

all the information we possess of it is derived from the reports of persons who are totally devoid of scientific knowledge, and are accustomed in their comparisons of distances to trust to vague estimates formed by parties who have travelled through the different districts."

With respect to the sketch map it will be seen that Mr. Hodgson gives only one isolated peak, segregated from all the rest, whereas nothing can be more contrary to the fact as regards the Himalayas; besides, the configuration of the ground must be very different from that represented by Mr. Hodgson, being in fact difficult in the extreme. There is, however, no evidence to show that Mount Everest and Deodanga are identical. Mr. Hodgson says, "The Bhutia Cosi has its sources at Deodanga, a vast Himalayan peak, situated some 60 or 70 miles east of Gosainthan, *and a little north and east of the Kuti Pass, being probably the nameless peak,** which Colonel Waugh conjectures may rival Kanchanjinga in height. The river flows from the base of Deodanga, past the town of Kuti, and has a south-west direction from Kuti to Dallalghat."—*Vide* 'Memorandum on the Seven Cosis.'

Now, on comparing Mr. Hodgson's sketch with the accompanying chart, which exhibits all our peaks laid down between Katmandu and Darjiling, it will be seen that it is not likely the Bhutia Cosi could have its sources at our Mount Everest, because it appears to me, as far as I can judge, that the Dud Cosi, which rises "amid the perpetual snows," and also the Arun Cosi, would be to the left and right of Mount Everest respectively, so that it does not seem clear how the Bhutia Cosi can originate from our Mount Everest.

Again, Mr. Hodgson says—"This great mass is visible alike from the confines of Nepal proper (the valley), and from those of Sikkim, and all the more unmistakeably because it has no competitor for notice in the whole intervening space. It is precisely half way between Gosainthan, which overlooks Nepal proper, and Kanchang, which overlooks Sikkim." Now, a slight computation will serve to show that Mount Everest is invisible from the valley, being depressed nearly one minute and thirty seconds below XVIII. The most conspicuous mass visible from Katmandu or the valley would be our peaks XIX. and XX. Nor is Mount Everest visible from the confines of Sikkim, as Major Sherwill did not see it anywhere on his route from Singelelah to Kanglanamo; the height of the latter place Major Sherwill estimates to be 13,000 feet. He says, "One mountain in the Nepal range is a most remarkable object, both for

* The words underlined by me are omitted in Mr. Hodgson's communication on the Native Name of Mount Everest, J. A. S., No. 5, 1856.

its curious shape and for its immense height: its name none of my party knew, nor have I yet succeeded in obtaining the name. The peak is a hollow crater-like mountain, probably 27,000 feet in height, with a long table mountain attached to it, both covered with glaciers. To the west of this great mountain are fine distinct peaks separating the large mountain from a hollow shell-like and perpendicular mountain about 26,000 feet in height."—('Notes upon a Tour in the Sikkim Himalaya Mountains,' J. A. S., No. 8, 1853.) The mountain herein alluded to is our XIII., the height of which is 27,779 feet, Mount Everest being depressed nearly 14 minutes below XIII.

From the foregoing I am led to infer that Mr. Hodgson has probably mistaken one peak for another, more especially since the country is said to be very polyglottic; in fact, Mr. Hodgson himself throws some doubt on the identity of Mount Everest with Deodanga, or Bhairavathan, or Bhairava Langur, or Gnalthamthangla, as his own expression, "being *probably* the nameless peak which Colonel Waugh conjectures may rival Kanchanjinga in height," evidently shows. The following extract from an interesting account of the ascent of the mountain Sumeru Parbut by Captain Robertson, given in the Report of the British Association for the Advancement of Science for 1855, will serve to show how liable we are to fall into mistakes in identifying a group of peaks even when in their immediate neighbourhood:—"On the right of the glacier rose the three great Jumnotri peaks, designated in sheet 65 of the Trigonometrical Survey of India, black E, great E, and little E, the altitudes of which as given in map are 21,155, 20,916, and 20,122 feet. The peaks designated in the Trigonometrical Survey great E and little E, are the two summits of a mountain which the natives call Bunderpunch. On the left the glacier was bounded by a wall of precipices, terminating in the lofty snow-covered peak of Sumeru Parbut. The height of this peak is not given in the survey map, but from its appearance, as compared with that of the measured peaks, and also from the height it rises above the limits of perpetual snow, I should estimate its altitude at about 18,000 feet. The altitude of Bunderpunch-ke-ghattee I estimated at about 16,000 feet.

"In making my agreement with the Brahmin I was under the impression that Sumeru Parbut was one of the measured peaks, and it was not until I reached Bunderpunch-ke-ghattee that I discovered my mistake."

W. H. SCOTT,
Draughtsman, Surveyor-General's Field Office.

Memorandum by J. HENNESSEY, Esq., *Second Assistant in charge of Geodetic Computations at Trigonometrical Survey, Head-Quarters.*

I HAVE carefully perused Mr. B. H. Hodgson's paper attempting to identify Mount Everest with some hill variously called "Deodanga, vel Bhairavathan, vel Bhairavlangur, vel Gnalthamthangla."

I am of opinion that Mr. Hodgson has advanced no evidence whatever to prove this identity.

The arguments stated, if indicating any one peak more than another, point to Peak XVIII. as the one called Deoadhanga, &c.

Thus, Mr. Hodgson, speaking of Deodanga, says, "It is a great mass. . . . . It is visible from the confines of Nepal (proper)."

Now the straight line passing through Mount Everest and XVIII. and extended towards Nepal, passes nearly through the centre of that valley, nor is there any point in the latter at which the angle Mount Everest and XVIII. exceeds 3°. Taking any point on the straight line, Mount Everest, XVIII., and valley, and within the valley, the latter peak shuts out the former, as can be demonstrated by calculation. It is also exceedingly improbable that the same does not occur from *any* point whatever in the valley; but, be this as it may, it is impossible, under the circumstance, that XVIII. would admit of a "great mass" of Mount Everest being seen.

And yet that Deodanga, &c., is *seen* from the "confines" of the valley, and that it is "a *great mass*," we have Mr. Hodgson's evidence to show. That gentleman has therefore demonstrated, at least, that Mount Everest and Deodanga are *not* identical.

I have seen Mount Everest, certainly, from near Titalyah in Purneah, very probably from other districts along the Terai. It never struck me as a great mass.

J. B. N. HENNESSEY, Second Assistant General
Trigonometrical Survey of India.

Memorandum by J. W. ARMSTRONG, Esq., *Civil Assistant General Trigonometrical Survey of India.*

IN compliance with Department Orders No. 10,267, by the Surveyor-General of India, under date the 22nd April, 1857, I beg leave to submit the following remarks on the question which has been mooted regarding the identity of Mount Everest with Deodanga vel Bhairavathan.

This lofty pinnacle of the Himalayas was observed by me in 1846 from a distance of above 200 miles, and by Colonel Waugh

and Messrs. Lane and Nicolson from different stations of the north-east longitudinal series, and characterised by each according to the nomenclature which each had adopted. When the observations were all collected, and the snow points discussed and arranged in order from east to west, this lofty peak was characterised by the numeral XV. There were no means of ascertaining either the name of this mountain or the names of the others which were observed; and when its stupendous height was finally determined, a name was sought for to stamp its greatness; and none presented itself in the absence of its own local appellation more fitting than that of our renowned ex-Surveyor-General.

This nomination has been impugned by Mr. Hodgson on the strength of certain data advanced by him in the Journals of the Asiatic Society of Bengal—data which cannot be received as conclusive because they are purely conjectural.

The first datum is a *conjectural bearing and distance from positions never visited.*

The other data are the itineraries of two Nepalese embassies to Pekin, the distances of whose routes are equally conjectural. Mountainous as these routes must have been, and tortuous from the nature of the country, the distances noted as traversed must have been calculated, not so much by linear measure as by the difficulties encountered and the delays entailed.

Independent of these objections, this lofty snow peak is neither visible from the valley of Nepal, on account of an intervening though lower snow mount, nor even from the confines of Sikkim, for a similar reason; and, great as Mr. Hodgson's knowledge of the mountainous region of Nepal may be, his authority on the question at issue can be received only with diffidence, because it is enunciated without personal observation, and based upon the vague information of untrained travellers.

J. W. ARMSTRONG,
Civil Assistant General Trigonometrical Survey.

Memorandum by Lieut. J. F. TENNANT, *Engineers, First Assistant General Trigonometrical Survey, in charge Jogi Tila Series.*

DURING the identification of Colonel Crawford's peaks, and the discussion of the identity of Mount Everest with Deodanga, I have paid a good deal of attention to the question.

There are no means of knowing the position of Deodanga beyond what are given by Mr. Hodgson. These consist,—1st, of an Itine-

rary by the two Nepalese embassies to Pekin; and, 2nd, of a paper on the Seven Cosis; 3rd, several assertions, for which no evidence is produced, in a letter to the Secretary of the Asiatic Society of Bengal.

As regards the first, or the Itineraries, I believe no person who has had any surveying experience can doubt their being absolutely useless as evidence of anything but the existence of a pass called Bhairava Langur. Mr. Hodgson supplies the information that it is identical in name with the adjacent mountain, which is, I conclude, derived from information. It is absolutely necessary, for using a route survey, that both bearings and linear distances should be given: the former in these routes are totally deficient; the latter are given along the road, which in mountainous countries would only be useful had nature so formed the passes that they should all lie in a straight line, and be reached one from another by a nearly level straight line. The document in question bears evidence that this is not the case by the route distances (117 miles). Mount Everest is far within Bhairava Langur, and this assumes the identity of their directions. If the Itinerary is competent to determine the position of Bhairava Langur, it is equally so to determine that of Pekin, and Mr. Hodgson would do geometers a service by explaining the process.

In a note to page 478 of No. VI. of the Journal of the Asiatic Society of Bengal, Mr. Hodgson says that Bhairava Langur is visible from the confines of Nepal (proper) as a great mass. Now, it is demonstrable that the summit of Mount Everest is *not* visible from Katmandu or any part of the valley of Nepal as a conspicuous or recognisable prominence, if indeed it at all tops the intervening snowy range. Mr. Hodgson also asserts that it is visible from the frontiers of Sikkim. It certainly is not visible from Kanglanamo, 13,000 feet high, being shut out by the shoulder of our Peak XIII.; and it is evident that the same result will be true all along the Singalilah range as far as Tonglo. I know that Mr. Hodgson asserts that it has no competitor for notice, but sound geometry contradicts Mr. Hodgson; and I for one prefer the evidence it gives to any that may be derived from the fallible rendering of fallible informants.

Mr. Hodgson further undertakes to find the name of any object whose bearing and distance he has. It may be possible in some cases, and possibly Dewalaghiri is one. I can only say, having surveyed myself among hills, that nothing is more fallacious than names given from a distance, even when an object is conspicuously visible. I myself believe that there is an identity between the mountains to which Captain Webb and the General Trigonometrical

surveyors have assigned the name of Dewalaghiri, but far be it from me to assert that that is its veritable name.

Mr. Hodgson is not probably less fallible than his predecessors, and yet Colonel Crawford places Dhayabang east of the meridian of Katmandu, nearly in the position of our Peak XXV., whereas another authority (Kirkpatrick) places it far west of that meridian; and here it is quite evident that the same name would not be assigned to the same peak. That Mr. Hodgson can get a name to any peak I believe; but that it will be the true name I do not believe, as a general rule.

2nd. Mr. Hodgson gives a Memorandum on the Seven Cosis, with a sketch. The sketch has no scale, and is confessedly a roughly-drawn document not founded on survey. It can, therefore, hardly be admitted as evidence of anything, but I shall show reason to doubt its being in Mr. Hodgson's favour.

Mr. Hodgson in the paper asserts,—1st, that there is a mountain called Bhairava Langur, or Deodanga; 2nd, that that mountain is the source of the Bhutia Cosi; 3rd, that it is the same as Mount Everest of Colonel Waugh; 4th, that Mount Everest is in the place of the source of the Bhutia Cosi.

I have said there is presumptive evidence of the first assertion.

The second assertion rests solely on information which is not very reliable (as far as the experience of accurate surveyors goes) at the best; and is peculiarly liable to error in this case, as the Bhutia Cosi is only one of several confluent streams, and has never been seen, as far as I learn, in its separate form by any European; consequently its course must be liable to great error.

Mount Everest is stated to be identical with the source of the river, as the occupant of the same position; but, if this position be untrustworthy, there is an end of this, and consequently the proposition that both, being sources of the same river, are the same, falls to the ground.

The real result is from this paper that,—1st, there is a mountain called Deodanga the source of a river; 2nd, that a stream called the Bhutia Cosi comes from a snowy mountain; 3rd, that the coincidence of these two mountains is, to say the best, subject to doubt; and 4th, that there is no evidence to show the latitude, longitude, and height of Deodanga and Mount Everest to be identical at all.

If the sketch map be a true representation of the courses of the streams given, I believe Mr. Hodgson will be puzzled to find room for his other Cosis, giving each the feeding area necessary for its size.

If the mountain Deodanga be a little north and east of the Kuti Pass, unless that has been grossly misplaced by all the geographers who have exercised their talents on it, Deodanga *is not* Mount Everest.

I am aware that Mr. Hodgson says he has "explained the identity to the Society;" but I see no evidence to satisfy a geographer; and, were any evidence wanting to show a prejudgment of the case, we have his own letter, from which I quote as follows:—"A few words more may be given to the last point, as being the matter which chiefly forced my attention, as a political officer in Nepal, on the site of Mount Everest, and enabled me in after years, when I heard surmises (from, I think, Colonel Waugh himself, or from some of his subordinates) of the great height of a peak in that direction, to fix on Deodanga or Bhairavathan (both names are used) as being the enormous snow mass in question, and I have often of late repeated this here very recently to Mr. Blandford." All which demonstrates that before Mount Everest was named, or its definite position fixed, Mr. Hodgson had committed himself by repeated assertions of the identity of the forthcoming highest peak and Bhairavathan—an admission in itself sufficient to render all his evidence valueless.

Having got this fixed idea, Mr. Hodgson next has collected data for Bhairavathan or Deodanga, indefinite in themselves, and which might apply to any mountain-peak within a considerable range, including Mount Everest of course. On only one of these, or rather on a class of them, I think further comment necessary. The position of Mount Everest is connected with that of Gosainthan as a known point, but I have shown that name is not an evidence of identity. Further, the position of Gosainthan given in the Physical Geography of the Himalayas is not that generally given even as regards Katmandu; and, thirdly, that the longitude of Katmandu itself is uncertain to a small extent, and was so to a great amount till the identification of Colonel Crawford's peaks with ours reduced the limits, all which tells on the position of Deodanga.

On the whole, we have no evidence that Mr. Hodgson even saw Mount Everest, or that any one else ever recognised its pre-eminent height; for, contrary to Mr. Hodgson's repeated assumptions, it is demonstrably not a very conspicuous mass from a distance. There is a wide difference between the manner in which the known names have been given and that in which it is proposed to force this on us. All the points to which names have been given are laid down by competent surveyors under those names in most cases by some of the men who have fixed the final position. Deodanga has never

been so defined; and, even on Mr. Hodgson's showing, the names may be those of passes, or mountain masses, or particular prominences.

Mount Everest is the assigned name of a protuberance of no very large extent; and it would be most inadvisable, in my opinion, to abandon this definite name, which will soon be familiar to every English or European child, for one of the, to Europeans, unpronounceable names given by Mr. Hodgson, whose application is, to say the least, extremely doubtful, and whose misapplication would cause endless confusion.

J. F. TENNANT, Lieut. Engineers,
First Assistant General Trigonometrical Survey.

(True Copies.)

A. S. WAUGH, *Lieut.-Col., Surveyor-General of India, and Superintendent of General Trigonometrical Survey.*

The PRESIDENT.—We return thanks to Colonel Waugh and the officers under him for this valuable communication. I cannot conceive military engineers performing any duty more grateful to themselves than that of testifying to the merit of their former chief, by attaching the name of Everest to the highest mountain in the world.

NOTE TO MAP.—The longitudes are referable to the old value for the Madras Observatory, 80° 17′ 21″, to which a correction of 3′ 25″·5 is applicable to reduce to the value adopted by the Admiralty, Lt. Raper, and the Royal Astronomical Society, or 3′ 1″·8 to reduce to the result of Taylor's observations up to 1845.

Heights brought up from the Sea level at the mouth of the Hoogly by trigonometrical levelling, and verified by extension of the operation of the Sea at Bombay and Karachi.

The Peaks marked A, B, C, &c., are identical with Colonel Crawford's Points, and are so characterized by him.

W. H. SCOTT,
Chief Draughtsman Surveyor-General's Field Office.

A. S. WAUGH, Lieut.-Col.,
Surveyor-General of India.

ADDITIONAL NOTICES.

THE FAREWELL
LIVINGSTONE FESTIVAL.

THE festival in honour of Dr. Livingstone on his departure to explore the river Zambesi and the interior of South Africa, which originated in the Royal Geographical Society and was organized by the zeal of some members of that body at a few days' notice only, was held at the Freemasons' Tavern on the 13th February, 1858, Sir RODERICK MURCHISON in the Chair.

A wish having been expressed that a more ample account than appeared in the Daily Newspapers, should be preserved of the speeches made on that occasion, a record of them is now printed, to form a popular part of the Proceedings of the Royal Geographical Society; in order to mark the cordial spirit and right feeling with which the public were actuated in offering a farewell to the great and meritorious African Traveller.

It was intended to limit the number of his friends present to 250; but so great was the pressure for admission, that accommodation and good fare had to be provided for upwards of 350 persons, of whom a list is annexed, so far as the names were inscribed.†

Their Excellencies the Ministers of Sweden and Norway and of Denmark; the Dukes of Argyll and *Wellington; the Earls of Shaftesbury, Grey, *Sheffield, and *Shelburne; Lords *Radstock and Ebury; the Bishops of *Oxford and *St. David's; the Honourables Captain J. *Denman, R.N.; A. *Kinnaird, M.P.; and E. B. Wrottesley; Count *Strzelecki; Sir B. *Brodie; Sir E. North *Buxton, M.P.; Sir J. *Clark; Sir Culling *Eardley; Sir William Fraser, M.P.; Sir Ralph *Howard and Sir Moreton *Peto, M.P.; Sir John Forbes; Sir Charles *Nicholson; Sir John *Rennie; Rear-Admirals H. Austin, Sir G. *Back, and H. D. *Trotter; Major-Generals Murray, Hay, and J. E. *Portlock, R.E.; Messrs. W. E. Baxter, M.P.; W. Buchanan, M.P.; A. M. Dunlop, M.P.; J. Kershaw, M.P.; W. S. *Lindsay, M.P.; E. Miall, M.P.; J. *Pilkington, M.P.; J. Richardson, M.P.; J. Slaney, M.P.; Colonel W. H. *Sykes, M.P.; and J. A. *Warre, M.P.; Aldermen Exall, Finnis, and Wire; Baron de *Forrester; Chevalier de Forrester; Colonel Burgwyn (U.S.); Captains A. B. *Becher,

† The * denotes the Fellows of the Society.

R. *Collinson, W. H. *Hall, and M. S. *Nolloth; Commanders *Bedingfeld and Dayman, Royal Navy; Consuls Alcock, G. *Brand, and C. H. *Dickson; Major Ditmas; Captains Burgess, and L. T. *Cave; Lieutenant P. A. *Halkett, R.N.; and V. Zaroudny of the Imperial Russian Navy; the Reverends W. Cardall, A. Church, D. S. *Halkett, J. Hill, J. Hutchinson, C. Livingstone; T. *Marziot, W. Mitchell, J. F. Ogle of Patagonia, and C. S. Stewart (U.S.); Doctors Aikin, Cape, Cooke, Copland, Diamond, Gladstone, Hall, Hull, Bence Jones, J. *Kirk, E. Lankester, Waller Lewis, David Livingstone, J. O. M'William, Charles Murchison, W. F. *Packman, J. Percy, Lyon Playfair, C.B., Pointer, Price, William Sharpey, H. Norton *Shaw, F. Sibson, W. Smith, J. Trounser, and G. *Webster; Professors Bentley, Huxley, Maskelyne, R. Owen, Ramsay, Warington Smyth, and J. *Tennant; Messrs. Henry Ancell, S. H. Angier, George A. Arbuthnot, John *Arrowsmith, J. K. Aston, T. W. Aveline, T. *Baines, S. W. Baker, Charles Barry, James *Bateman, J. D. Barry (Cape of Good Hope), Joshua *Bates, J. *Betts, A. F. *Birch, J. W. *Birch, J. G. Blake, Wollaston *Blake, H. G. *Bohn, F. W. Bond, J. Boord, G. T. Bosanquet, H. W. Bristow, W. J. Brodribb, G. T. *Brooking, T. H. *Brooking, John *Brown, J. Brown, W. J. Browne, H. *Browning, C. Capper, L. P. *Casella, S. *Cave, D. Chambers, J. W. *Childers, C. Churchill, G. *Clowes, W. J. Cockerell, E. *Coghlan, H. W. Cole, R. *Cooke, Corscadden, Norman *Cowley, W. W. Crispin, Croggon, W. F. *Cumming, J. *Cunningham, Deorman, C. Wentworth *Dilke, H. *Donkin, T. Donkin, E. R. Dorrell, E. W. Dundas, J. Earle, Edmonstone, W. Ewer, P. Fenton, A. *Findlay, A. G. *Findlay, F. Fitch, A. P. Fletcher, C. *Fraser, J. P. Gassiot, J. Gayton, G. Gladstone, A. *Gordon, J. *Gould, G. P. Green, W. N. Green, T. *Greene, J. Griffin, W. D. Griffith, C. L. *Gruneisen, G. Hall, S. C. Hall, W. J. *Hamilton, J. Hammond, G. F. *Harris, W. Helps, E. *Heneage, R. Hepburn, F. Hicks, T. Hicks, A. Hill, J. Hill, P. Hill, Hind, J. Holmes, L. Hope, Hornblower, B. Hornby, J. Hornby, H. H. Howell, J. W. Hulke, E. Hull, G. O. Irwin, T. Ivens, J. James, W. P. Jervis, G. Johnstone, W. W. Kilpin, E. B. *Lawrence, W. Laird, Macgregor *Laird, F. Leach, F. *Le Breton, P. Lecki, M. Lethem, T. *Lee, T. *Letts, Ch. Lewell (of Finland), Leyland, W. *Lockhart (of China), G. A. *Lloyd, W. Lovecroft, L. Lucas, E. M'Dermott, D. *M'Gregor, R. J. Macintosh, P. *Macintyre, A. Macmillan, C. Makins, J. Marshall, Montgomery *Martin, F. Marziot, A. Miall, D. W. Mitchell, F. D. *Mocatta, J. C. Moore, C. E. Mudie, J. *Murray, R. W. Mylne, E. B. Neil, G. *Nelthropp, H. *Nesbitt, G. Newman, D. Owen, W. *Phelps, J. S. Pigeon, J. Piggott, J. H. *Plowes, F. L. *Price, W. C. Prince, E. J. *Ravenshawe, R. Rawlinson, Trenham Reeks, J. *Reid, J. Reive, J. S. Renton, J. *Reynolds, G. T. Rose, A. Rowlandson, A. Sim, H. S. Skeats, R. Slater, E. Osborne *Smith, F. Smith, J. Sidney Smith, G. *Smith, R. Smith, T. Spalding, T. *Staveley, W. C. *Street, A. Stuart, H. Sturt, A. *Swanzy, W. *Tait, J. Taylor, R. Thornton, G. Tolstoy (of St. Petersburgh), W. *Trotter, E. O. and H. *Tudor, A. *Vardon, Clf. *Verrey, G. Waugh, J. C. Webster, R. J. *Wheeler, Charles *White, H. *White, John White, W. Foster *White, J. H. Wicht (Cape of Good Hope), T. Wilcocks, C. Wilshire, W. H. Wilde, E. W. Wyon, J. *Yeats; C. Baring *Young, and C. J. Young, Esqrs.

The gallery was filled with ladies, among whom were the Countess Grey and Miss Copley, the Countess of Carnarvon, Mrs. Ashley, Mrs. Warre and Mrs. Henry Warre, Miss Burdett Coutts and Mrs. Brown, Lady Back, Lady Franklin, Mrs. Baines, Miss Cracroft, Mrs. Dundas, Mrs. Gordon, Mrs. Greene, Mrs. Portlock, Mrs. and Miss Wrottesley, Mrs. Owen, Mrs. and Miss Trotter, Mrs. Letts, Mrs. Bovet, Mrs. Findlay and the Misses Brown, Mrs. Lee, Mrs. Bedingfeld, Mrs. White, Mrs. McWilliam and Miss Cooke, Mrs. Woodifield, Mrs. Le Breton, Mrs. Finnis, Mrs. Twyford, Mrs. Livingstone, &c.

Each Toast was given with all the honours, and the band of the Grenadier Guards played suitable and chiefly Scottish airs.

The Duke of Sutherland also sent his Highland Piper to enliven the festival in honour of a countryman.

Grace was said before dinner by the Bishop of St. David's, and after dinner by the Bishop of Oxford.

The Toasts and Speeches were as follows:—

SIR RODERICK MURCHISON.—As a loyal subject of Her Majesty, I rise to propose the health of our beloved Sovereign. (*Loud cheers.*)

Reigning over many a distant land, and engaging as She does the affection and devotion of all her subjects, whether in the remotest of her Colonies or in these Islands, our gracious Queen has, through the wide spread beneficence of her rule, gained a *new title*, which must, I am sure, be most dear to her heart, and which specially connects Her Majesty with the object of this meeting; for Livingstone has told us that Victoria is known throughout the now protected races of South Africa, as the Queen of the people who love the Black Man. (*Loud cheers.*)

And as a striking proof of Her Majesty's desire to extend the blessings of Religion, Civilization, and Commerce to the great interior of South Africa, She has appointed our dear friend to be her Consul at those Portuguese Settlements from which he can successfully and efficiently carry out his noble mission. (*Great cheering.*)

Let me now add, Gentlemen, a piece of information which in these days of rapid diffusion of intelligence is unknown to you;—nay even to the great Journal of Printing House Square, and which will, I know, give unbounded pleasure to you all. Her Majesty, with that good taste and right feeling which is peculiarly her own, and which has ever characterized her private as well as public conduct, has selected this very day of our farewell festival to grant an interview to Livingstone and kindly to wish him God speed!

"The Queen, God bless her."

(*Enthusiastic cheers.*)

SIR R. MURCHISON.—Gentlemen, I now call on you to drink to the health of "H.R.H. the Prince Consort, H.R.H. the Prince of Wales, and the other members of the Royal Family." (*Cheers.*)

Whenever it has been my lot to occupy the Chair at a public meeting, I have invariably spoken of the Royal Consort as a Prince who, loving and encouraging science, letters, and art, is continually striving to do practical good service, by diffusing education and knowledge through all classes of the community. (*Cheers.*)

And as teaching by example is more efficacious than a thousand precepts, we are grateful to him for having soon after Livingstone's arrival in England conversed for some time with our great traveller in the presence of the younger members of the Royal Family; and specially we applaud his conduct for so guiding the education of his children, that in addition to the instruction usually given to Royal personages, the Prince of Wales and his brother have been taught by Faraday (*loud cheers*) and others, those great truths of Science upon the cultivation and diffusion of which, the present and future grandeur of the British Empire mainly depends. Let us then cordially drink to the health of His Royal Highness the Prince Consort, the Prince of Wales, and the other members of the Royal Family.

(*Loud cheers.*)

SIR R. MURCHISON.—It gives me true satisfaction, Gentlemen, to see that the object of our meeting is supported by the Representatives of two Foreign Sovereigns who have just reached our shores, who come from northern countries which are connected with us by many natural ties, and to whose rulers and people I am bound in affection for kindnesses received during my explorations of Scandinavia.

I allude to their Excellencies the Minister of the King of Sweden and Norway, Count Platen; and the Minister of the King of Denmark, Admiral Van Dockum. (*Loud cheering.*)

The representative of another Sovereign, who by his acts has shown his hearty concurrence in this exploration of South Africa, is unfortunately prevented by illness from attending; but that nobleman, the Count de Lavradio, with the enlarged views and right feeling which characterize the representative of the enlightened King of Portugal, has thus written to me:—

"I should have been happy to have profited by this good opportunity to announce personally to the distinguished friends of Dr. Livingstone, that my august Sovereign no sooner learnt that Dr.

Livingstone intended to explore the Zambesi than he issued the most positive orders to the authorities of Portuguese Africa to offer to the learned and courageous traveller all the protection and all the aid which he might need, and to receive him with all the attention due to his great merits.

"Be assured, my dear Sir Roderick," his Excellency adds, "that my Sovereign, as enlightened as he is virtuous ['We all know the merits of the young King,' interposed the Chairman (*loud cheers*)], rejoices whenever it is in his power to do anything to advance civilization and to afford some proof of his unalterable affection for his most ancient, most constant, and most natural ally, Great Britain." (*Loud cheers.*)

"I have full confidence," continued the Count, "that the new explorations of Livingstone will have great results for science, commerce, and the civilization of Africa. The infamous slave trade can never be brought to an end without first putting a stop to slavery in the interior of Africa, which will be the more easily brought about when the unfortunate Africans are instructed in the principles of religion and education, and are taught the true value of labour.

"I offer then my most ardent hopes for the prosperous journey of Livingstone and for the success of his researches, trusting that he may return safe, sound, and glorious, to receive the blessings of his countrymen and those of the enlightened men of all countries." (*Loud cheers.*)

Reverting now, Gentlemen, to the toast, "The Ministers of Foreign Powers who have honoured us by their presence," I drink to the health of our distinguished visitors Count Platen and Admiral Van Dockum. (*Great cheering.*)

COUNT PLATEN, in responding to the toast, said that he should ever take a deep interest in any enterprise which affected the prosperity of Great Britain, not only on account of the mutual relations which existed between England and that country of which he was the representative, but also from personal feeling; for perhaps the three happiest years of his life had been spent, if not upon English ground, at least upon English bottom, he having served three years in the British navy. (*Loud cheers.*) He could only add that, in common, he was sure, with all those to whom the toast referred, he most cordially concurred in the great objects of the expedition of their distinguished friend Dr. Livingstone, and, in the name of his colleague and himself, he most heartily wished him complete success, and a safe return to his native land. (*Loud cheers.*)

SIR R. MURCHISON.—On no former occasion did I ever propose the toast of the Navy and Army with a higher satisfaction than at the present moment; for never at any period of my life was I more proud of the heroism of my countrymen, whose noble bearing in India not only excites the heartfelt applause of every Englishman, but is, I know, extolled by foreign nations as a prowess scarcely if ever paralleled in the annals of war. (*Loud cheers.*)

And though the men of my old profession, the soldiers, have necessarily had to bear the brunt of this great spasmodic and unexampled Indian outburst, we all know how an intrepid band of blue jackets under William Peel have mainly contributed to the winning of victories a thousand miles distant from that element in which they are supreme, and will I trust for ever remain so. (*Loud cheering.*)

Gentlemen, in alluding to the Army let me say, that I cannot now wear a Peninsular medal, and recollect that I am one of those still surviving who had the honour to accompany our great Duke when he first set his foot on the shore of Portugal, without expressing to you the sincere gratification it gives me to see here, and sitting by the side of Livingstone, the son of that illustrious man (*great cheering*). My regard for the present Duke has indeed been recently raised into high respect, by knowing that it is the anxious study of my noble friend to search out and publish documents which, but for the devotedness of the son, might have lain long in obscurity—documents which now issuing from the press demonstrate, that the young Wellesley, the rising soldier of India, possessed even then much of the thoughtfulness, prescience, and wisdom which characterized the future Wellington. (*Loud cheers.*)

It would naturally be my wish to call upon the son of my revered commander to answer for the Army; but I have not forgotten military duty, and a senior officer is present—one, fortunately, who is directly and honourably connected with this festival; for it was General Murray Hay, who, commanding in the Mauritius, received Livingstone when he emerged from the east coast of Africa, and was the first of our countrymen who hospitably sheltered the houseless traveller. (*Loud cheers.*)

In like manner it gives me real pleasure to perceive that the Navy is represented by my gallant and good friend Admiral Trotter, whose name and exploits are interwoven with the cause of the civilization of Africa (*cheers*), and who, when recently on duty at the Cape Station, was most serviceable in enabling us to keep up our intercourse with the great traveller in the interior of Africa. (*Cheers.*)

I give you then the Navy and Army, and call on you to drink to

the health of Admiral Trotter and General Murray Hay. (*Loud cheers.*)

REAR-ADMIRAL TROTTER.—I rise to return thanks for the Navy on the present occasion with peculiar pleasure, as I claim for our service the honour of having most powerfully operated in the same cause with our distinguished guest—I mean the civilization of Africa; and I believe Dr. Livingstone has lost no opportunity of proclaiming in his addresses, though that part of them to which I allude has not always been faithfully reported, that all hope of success in that great object over that vast continent depends, humanly speaking, on the extinction of the slave trade, and that the most powerful and indispensable means to this end is the British squadron on the coast of Africa: our efforts in this cause, in conjunction with the exertions of such men as Livingstone, will hereafter be classed amongst the noblest deeds of the Navy.—It is therefore, I say, with especial pleasure that I return thanks on the present occasion. (*Cheers.*)

MAJOR-GEN. MURRAY HAY.—Being the senior military officer present, it is my duty, Sir, to respond to the toast you have proposed, and the great and immortal man so justly eulogized by you, has taught us that to a soldier duty is a sacred word.

Distant employment prevented me from sharing personally the brilliant services of the army of the Crimea, but it is to me a great consolation to think that I was thereby enabled to form, I trust, a lasting friendship with our distinguished guest, Dr. Livingstone. On his arrival at Mauritius, I received him as a comrade from a hard fought and gallantly won battle; for he too is a soldier, a soldier of the Cross. (*Cheers.*) The unanimous voice of this great nation has proclaimed, loudly proclaimed, that the British Army has gloriously upheld the renown of its predecessors and of its country, and that Army has received the reward dearest to the heart of a soldier in the applause and approbation of our gracious Queen and the thanks of a grateful country. (*Loud cheers.*)

SIR R. MURCHISON.—I rise, Gentlemen, to propose the toast of the evening—"Health to the excellent man who sits on my right hand, and success to his expedition." (*Vehement and long continued applause.*) When this farewell dinner to my distinguished friend was suggested ten days ago only, by a few ardent geographers, with a request

that I would take the Chair, it might well have been supposed that in so brief a space of time it would be difficult to obtain an attendance worthy of the great occasion; but I felt assured that the name of Livingstone alone would attract an assembly larger than any room in London could contain. (*Cheers.*) My anticipation, Gentlemen, was correct; and it truly gratifies me to see that this impromptu "coup de voyageur" has brought together men of real distinction in all the great classes of the British public. (*Cheers.*) The only weak part of the programme, I said to my friends, would be that of your Chairman (*cries of "No, no"*); but at all events, you know, Gentlemen, that my geographical friends and myself have done our best to honour the great traveller and good missionary. (*Cheers.*)

At any public meeting held a year and a half ago, it would have been necessary to dwell upon the merits of Livingstone; but now his name has become a household word among my countrymen, and no efforts of mine can raise him higher in that esteem which he has won for himself, and specially I rejoice to say by the sale of 30,000 copies of the work issued by the flourishing firm of Murray, Livingstone, and Co. (*laughter*), and by which he has secured independence for himself, and a provision for his wife and family. (*Cheers.*)

My eminent friend has not only made us thoroughly well acquainted with the character and disposition of the inhabitants and the nature of the animals and plants of the interior of Africa, but has realized that which no missionary has ever accomplished before; since with consummate talent, perseverance, and labour he has laid down the longitude as well as latitude of places hitherto unknown to us, and has enriched every department of knowledge by his valuable and original discoveries. These are great claims upon the admiration of men of science; but, great as they are, they fall far short of others which attach to the name of the missionary who, by his fidelity to his word, by his conscientious regard for his engagements, won the affections of the natives of Africa by the example which he set before them in his treatment of the poor people who followed him in his arduous researches through that great continent. (*Loud cheers.*)

Sitting by my side (laying his hand on Dr. Livingstone's shoulder) is the man who, knowing what he had to encounter—who having twenty or thirty times struggled with the fever of Africa—who, knowing when he reached the western coast, at St. Paul de Laonda, that a ship was ready to carry him to his native land, where his wife and children were anxiously awaiting his arrival, true to his plighted word, threw these considerations, which would have influenced an

ordinary man, to the winds, and reconducted those poor natives who had accompanied him through the heart of the country back to their homes!—thus by his noble and courageous conduct leaving for himself in that country a glorious name, and proving to the people of Africa what an English Christian is. (*Loud and long continued cheering.*)

So much for the character of the man of whom, as a Scotchman, I am justly proud; and now a few words with regard to his present expedition, of which I may say that no enterprise could have been better organized than it has been, under the recommendation of my distinguished friend, aided by the countenance and hearty co-operation of Lord Clarendon, and the very judicious arrangements of Captain Washington, the Hydrographer of the Admiralty, on whom fortunately has fallen the chief labour of its organization. (*Loud cheers.*) The naval officer of the expedition is Commander Bedingfeld, a man well known to geographers for his successful explorations of the coast and rivers of Western Africa, especially the Congo, and my dear friend will no doubt receive substantial assistance from that gallant officer. (*Cheers.*) Dr. Kirk, of Edinburgh, an accomplished botanist, zoologist, and physiologist, also accompanies the expedition; whilst my clever young friend Richard Thornton will, I doubt not, do good service as the mining geologist. (*Cheers.*) Mr. Baines, too, whose previous travels in Africa and North Australia and striking sketches are well known to the public, will be there; and last but not least in usefulness among the members of the expedition let me mention Mrs. Livingstone. (*Loud and long continued cheering.*)

When I remember the efforts which have been made in the cause of Christianity and for the diffusion of knowledge by that exemplary lady (*loud cheers*), when I know how she, the daughter of that faithful missionary, the venerable Moffat, has educated her children, and when I see the spirit with which she is again going to cross the broad seas and to share all the toils and perils of her husband, I cannot but think that the services of Mrs. Livingstone (acquainted as she is with many of the languages of South Africa) will tend materially to the success of the expedition. (*Loud and protracted cheering.*)

But, Gentlemen, I would not, however, wish you to raise your hopes too high as to the immediate results of this expedition, which is in truth one of an exploratory character only. It is, in fact, merely the sowing of the seed which, under God's Providence, may produce an abundant harvest. We must not look to a sudden importation of indigo or of cotton, and those raw materials which

we manufacture in this country, nor must we expect suddenly to light upon a new El Dorado; though I believe that my friend may find districts which abound in gold and copper, and good thick coal-seams.

Yet if, after all, those expectations to which the commercial world looks should fail—if we gain nothing more than the implanting in Africa of that good name which Dr. Livingstone is sure to leave (*cheers*), and that accession to our knowledge which the discoveries of our great explorer are certain to supply, and which it would be a disgrace to Britain not to endeavour to obtain, even then I say that the Livingstone expedition will have a great and a glorious issue. (*Loud and long continued cheering.*) I propose, therefore, the health of our eminent friend Dr. Livingstone, and success to his noble enterprise. (The toast was drunk with the utmost enthusiasm; and after the cheering had ceased, at the suggestion of a gentleman in the body of the room, three more hearty cheers were given for Mrs. Livingstone.)

The name of Sekeletu, chief of Livingstone's Makololo friends, was announced at the bottom of the room, and a cheer was claimed for him.

DR. LIVINGSTONE, in rising to return thanks, showed unmistakeably how much he was affected by the reception which he had met with.

He said,—When I was in Africa I could not but look forward with joyous anticipation to my arrival in my native land; but when I remember how I have been received, and when I reflect that I am now again returning to the scene of my former labours, I am at a loss how to express in words the feelings of my heart. (*Loud cheers.*) In former times, while I was performing what I considered to be my duty in Africa, I felt great pleasure in the work; and now, when I perceive that all eyes are directed to my future conduct, I feel as if I were laid under a load of obligation to do better than I have ever done as yet. (*Loud cheers.*) I expect to find for myself no large fortune in that country (*renewed cheers*), nor do I expect to explore any large portions of a new country; but I do hope to find in that part of the country which I have partially explored, a pathway by means of the river Zambesi which may lead to highlands where Europeans may form a healthful settlement, and where by opening up communication and establishing commercial intercourse with the natives of Africa they may slowly, but not the less surely, impart to the people of that country the knowledge and the inestimable blessings of Christianity. (*Loud cheers.*)

I am glad to have connected with me in this expedition my gallant friend Captain Bedingfeld (*hear, hear*), who knows not only what African rivers are, but also what are African fevers. (*A laugh.*) With his aid I may be able to determine the principles of the river system of that great continent; and if I find that system to be what I think it is, I propose to establish a depôt upon the Zambesi, and from that station more especially to examine into that river system, which, according to the statements of the natives, would afford a pathway to the country beyond, where cotton, indigo, and other raw material might be obtained to any amount.

I am happy also in being accompanied, as Sir Roderick has told you, by men experienced in geology, in botany, in art, and in photography, who will bring back to England reports upon all those points, which I alone have attempted to deal with, and with very little means at my disposal. (*Loud cheers.*)

The success—if I may call it success—which has attended my former efforts (*renewed cheering*) to open up the country mainly depended upon my entering into the feelings and the wishes of the people of the interior of Africa. I found that the tribes in the interior of that country were just as anxious to have a path to the seaboard as I was to open a communication with the interior, and I am quite certain of obtaining the co-operation of those tribes in my next expedition. Should I succeed in my endeavour—should we be able to open a communication advantageous to ourselves with the natives of the interior of Africa, it would be our duty to confer upon them those great benefits of Christianity which have been bestowed upon ourselves. (*Cheers.*) Let us not make the same mistake in Africa that we have made in India (*renewed cheering*), but let us take to that country our Christianity with us. (*Cheers.*)

I confess that I am not sanguine enough to hope for any speedy result from this expedition, but I am sanguine as to its ultimate result. (*Cheers.*) I feel convinced that if we can establish a system of free labour in Africa, it will have a most decided influence upon slavery throughout the world. (*Loud cheers.*) Success, however, under Providence, depends upon us as Englishmen. I look upon Englishmen as perhaps the most freedom-loving people in the world, and I think that the kindly feeling which has been displayed towards me since my return to my native land has arisen from the belief that my efforts might at some future time tend to put an end to the odious traffic in slaves. (*Loud cheers.*) England has, unfortunately, been compelled to obtain cotton and other raw material from slave States (*cheers*), and has thus been the mainstay and support of slavery in America. Surely, then, it follows that if we can succeed in obtain-

ing the raw material from other sources than from the slave States of America, we should strike a heavy blow at the system of slavery itself. (*Loud cheers.*)

I do not wish, any more than my friend Sir Roderick, to arouse expectations in connexion with this expedition which may never be realized, but what I want to do is to get in the thin end of the wedge (*cheers*), and then leave it to be driven home by English energy and English spirit. (*Loud cheers.*)

I cannot express to you in adequate language the sense which I entertain of the kindness which I have received since my return to this country, but I can assure you that I shall ever retain a grateful recollection of the way you have received me on the eve of my departure from my native land. (*Cheers.*)

Reference has been made in language most kind to Mrs. Livingstone. (*Cheers.*) Now, it is scarcely fair to ask a man to praise his own wife (*laughter*), but I can only say that when I left her at the Cape, telling her that I should return in two years, and when it happened that I was absent four years and a half, I supposed that I should appear before her with a damaged character. (*Laughter.*) I was, however, forgiven. (*Laughter and cheering.*) My wife, who has always been the main spoke in my wheel, will accompany me in this expedition, and will be most useful to me. She is familiar with the languages of South Africa, she is able to work, she is willing to endure, and she well knows that in that country one must put one's hand to everything. In the country to which I am about to proceed she knows that at the missionary's station the wife must be the maid-of-all-work within, while the husband must be the jack-of-all-trades without, and glad am I indeed that I am to be accompanied by my guardian angel. (*Loud cheering.*) Allow me, in conclusion, to say one word in reference to our excellent Chairman. In packing up my things a few days ago, I found the identical Address which he delivered to the Geographical Society in 1852, and which he had the impudence to send out to me in the heart of Africa, where it lay upon an island a whole year before I got it. In that Address my distinguished friend actually foreshadowed a great portion of my discoveries; and all I can now say is, that I hope he will not do the same again. (*Laughter and long continued applause.*)

The company then gave "Three times three for Mrs. Livingstone," and that lady, from the gallery, bowed in acknowledgment of the compliment.

SIR R. MURCHISON.—I now call on my scientific friends and others to drink to the toast of "The Legislature which supplied the means, and the Government which prepared the measures, to carry out the Livingstone Expedition." (*Applause.*)

It was indeed most cheering to all geographers and philanthropists to witness the cordial spirit with which the House of Commons granted the sum asked for to promote the Livingstone Expedition—a sum, however, which after all I consider somewhat inadequate to the great object in view (*hear, hear*), but which, in unison with the wishes of the public, the Parliament will, I am confident, augment when needful. (*Cheers.*)

As to the acts of the Government I can truly say, that having had opportunities of observing and scrutinising them, including the warm sympathy and aid of Lord Palmerston and his associates, I cannot too highly commend their conduct. Lord Clarendon in particular took the most lively interest in promoting the welfare of Livingstone long before the traveller came home, by sending out orders to succour the unaided Missionary; and he has since zealously and sincerely laboured to promote by every means in his power the present expedition, and has also counselled Her Majesty to give to our friend that public appointment which will enable him to be really useful; it having been a principle with the noble Earl to lose no opportunity of raising the position of the poor African, and of rendering him the cultivator of substances of which Britain has need. (*Cheers.*)

In proposing this toast of the Legislature and Her Majesty's Government, I call upon the Duke of Argyll to speak for the Upper House of Parliament and the Government, and Mr. Baxter for the House of Commons; and if the band will only play "The Campbells are coming," we who know the powers of the Noble Duke are certain that a good speech will follow. (*Loud cheers.*)

The DUKE of ARGYLL.—I deem it a great honour, Gentlemen, to any Government and to any Parliament to be able to assist in that noble enterprise to which Dr. Livingstone has devoted his best energies, and to which he is now willing to devote his life. Perhaps no enterprise of modern times has attracted so large an amount of public attention; and this because it includes within itself almost every variety and degree of interest. First and foremost there is the interest which attaches to the character of the man; and it is right, Gentlemen, that this should be the first and foremost interest of all. The progress of the world depends upon its great men; and happy is that people which knows them when they appear. (*Cheers.*)

Dr. Livingstone has to-night told us, with that moderation and sobriety of expectation which is one of the most remarkable characteristics of his mind, that he looks for no great immediate results; but he hopes, he says, to be able to serve as the "small end of the wedge." Now, Gentlemen, I say that at all times and in all successful movements for the improvement of the human race, "the small ends of the wedge" have been individual men of great endowments for their special work. (*Loud cheers.*)

I will not dwell on some of those features in the character of Dr. Livingstone which have been referred to with so much feeling by our Chairman; but I think I cannot go far wrong when I say that one thing at least for which he is admired by his countrymen is for that lofty and enduring courage—that true British pluck—for there is no better word—of which we have lately seen many noble examples, but which has never been exhibited in a nobler form than that which—not under the strong incitement of a desire to preserve the lives of those nearest and dearest to him, or of the pride, the just pride of national dominion, but for objects hid in the far distant future—has sustained Dr. Livingstone for years through the deserts and the swamps of Africa. Then, as another great source of public interest, there is the love of natural science. I recognise around me the faces of many who are devoted to that science in its various branches: nor is there one of them who may not reasonably expect material additions to his knowledge from the researches of our guest. Dr. Livingstone has told us how our Chairman, in two great branches of inquiry in which he is almost equally distinguished, had in some degree anticipated and forestalled the result of his (Dr. Livingstone's) discoveries; and sharing as I am sure our Chairman does in the higher interests of this expedition, he cherishes also, I suspect, a secret hope that it may add another province to the already extended dominions of the Silurian king. (*Laughter.*) I see at this table my distinguished friend Professor Owen. He also, Gentlemen, is well able—no man more able—to appreciate the "higher ends" of our guest's exertions; but mingled with his interest in these, he too perhaps has an eye open to special pursuits—and to bones which may extend the range of his favourite "homologies." (*Laughter.*)

But the real source, Gentlemen, of the interest taken by the public in the enterprise of Dr. Livingstone, is the deep and abiding interest which they take in that great cause with which it is specially connected—that great cause to which their attention was roused in the last generation by the eloquence of Wilberforce and his associates—the cause of the African race. (*Cheers.*) I have been astonished during

this last week to receive from America a Journal containing the report of a discussion which has lately taken place in the Senate of that great Republic, in which it was asserted that there were evident symptoms of a change of feeling upon this subject in England. And I was even more surprised to see the reply made to that assertion by another member of the same body, which was to the effect that he did not believe there was any change on the part of the people of this country, although he feared there was a change of policy on the part of its Government. Now, Gentlemen, there is nothing I am more anxious to say on this occasion than to give an emphatic denial to both assertions. (*Cheers.*) There is no change in the feeling of the people—as little is there any change in the policy of the Government. I need hardly say that as regards slavery in America the Government of this country neither has, nor can have, any policy at all. There can be no doubt that any public or official interference on our part upon that subject would only tend to add to the many powerful motives already arrayed on the side of slavery, the just susceptibilities of national independence. But as regards the policy of the Government with reference to the Slave-trade, and generally towards the African race, it is the same as it has ever been since this country was awakened to her duty. I think I could appeal to the keenest opponent of Lord Palmerston whether, during his long and distinguished public career, there has been any subject on which he has shown more constantly his characteristic energy and tenacity of purpose. (*Cheers.*) I can sincerely say that the great motive which has induced him and my noble friend Lord Clarendon, and the other Members of the Government, to support the enterprise of Dr. Livingstone, has been the hope that it may tend to promote the civilization and improvement of the people of Africa. (*Loud applause.*)

Before I sit down, Gentlemen, I trust I may be allowed to refer for a moment to a matter which has been touched upon by our Chairman. I am proud of Dr. Livingstone not only as a Scotchman, but as a native of that part of the country with which I am more particularly connected. Dr. Livingstone has himself informed me that at a very recent period his family came from the little Island of Ulva, on the coast of Argyllshire, an island belonging to what Sir Walter Scott has called

> "the group of islets gay
> That guard famed Staffa round."

And I deem it, Gentlemen, a circumstance not altogether unworthy of remark, that Ulva stands in very close proximity to another island

which was one of the earliest seats of Missionary enterprise in our own country. Most of you will probably recollect the famous sentence in which the great moralist and philosopher of England, Dr. Johnson, records his visit to that celebrated spot. I think I can remember it with substantial accuracy. "We were now treading that illustrious island whence roving tribes and rude barbarians derived the benefits of knowledge and the blessings of religion. The philosophy of that man is but little to be envied whose patriotism would not kindle on the plains of Marathon, or whose piety would not grow warmer among the ruins of Iona." If such be the feelings with which we should tread upon the spot which at the distance of so many centuries has been hallowed by the footsteps of the Christian Missionary, surely it is with something of the same feelings of reverence with which we should assemble here to-night, to bid God-speed to one whose name will be remembered in after ages, and perhaps by millions of the human race, as the first pioneer of civilization and the first harbinger of the Gospel. (*Loud and long-continued cheers.*)

MR. BAXTER, M.P., in responding for the House of Commons, said that he regretted that the duty had been committed to so feeble hands as his. He believed that this honour had been conferred on him as the representative on this auspicious occasion of that Scotland which had given birth to, and which was so justly proud of, Dr. Livingstone. He only wished that his excellent friend had been present to hear the general and repeated cheers which in December last greeted the Chancellor of the Exchequer's proposal that a sum of money should be advanced for the purposes of a new expedition. As for the Government and the House of Commons, they had only done what it was their duty to do, and what the country demanded of them, and he hoped that the 5000*l.* grant would prove but the earnest and foretaste of what this nation would yet do for the cause of discovery and colonization in Africa.

SIR BENJAMIN BRODIE.—I shall not occupy your time, Gentlemen, for more than a few minutes before I name the toast which I have undertaken to propose.

We recognize in Dr. Livingstone the intrepid and enterprising traveller, exploring regions which, in great part at least, had not been before explored by Europeans, contributing to the general stock an abundance of valuable information in geography, in natural history, in geology; associating with races of mankind of

whom we had little or no previous knowledge, conversing with them in their own language, familiarising himself with their habits, institutions, and modes of thought; and thus promoting the advancement of that most important of all the sciences, the science of human nature. (*Cheers.*)

Nor was Dr. Livingstone thus occupied, as in the case of ordinary travellers, for a few months or for one or two years, but for many successive years. During this long period he continued his researches with unabated zeal; without being appalled by danger, or disheartened by the privations to which he was subjected, or the difficulties which he had to encounter; not the least of these being, repeated and severe attacks of bodily illness. (*Cheers.*)

But Dr. Livingstone is also presented to us under another aspect, as a Christian missionary, using his endeavours to extend the advantages of civilization, not after the fashion of the Roman conquerors of Gaul and Britain, by transplanting, at the cost of rapine and bloodshed, the arts and sciences of an older and more civilised people into the conquered country, but by communicating knowledge, promoting education, and inculcating the principles of a religion which enjoins the exercise of kindness, charity, and justice, which tells us that we are to forgive our enemies, and do unto others as we would that they should do unto us.

There are others in Africa engaged in the same pursuits, who, however occupied with their duties as missionaries, have found leisure from time to time to transmit to Europe important information on other subjects, and to whom science is much indebted; and I have to propose to you as a toast—"The members of the Missionary Societies who by their Christian labours have so much enlarged our acquaintance with Africa and its inhabitants." (*Cheers.*)

LORD EBURY said he sincerely regretted that his noble friend Lord Shaftesbury, who had taken such a deep interest in the career of Dr. Livingstone, should have left the room; for he could with so much greater propriety have responded to the toast which had just been proposed. The moral of the evening, however, was, that England expected of all her sons not only that they should do their duty, but that they should do it under the most adverse circumstances, and he could not shrink from attempting to perform this task to the best of his ability. If ever there was an occasion upon which the Missionary Societies might indulge in some pardonable degree of exultation, it was the present. (*Cheers.*) If they desired to view a successful monument of their labours, they might in truth point to the extraordinary man who sits beside the Chairman, and to the multitude of preeminently

honoured names in art and science, and, above all, the great work of Missionary enterprise, which thronged this hall. (*Cheers.*) Humanly speaking, theirs had been the task of giving to Dr. Livingstone the means of displaying those wonderful qualifications which have concentrated such unbounded interest in his proceedings, both past and future. It was for the public of England now to do its part,—to give free scope to this great genius in the double work of civilization and evangelization. They must have seen how Dr. Livingstone had successfully encountered all the trials of adversity, fatigue, sickness, weariness, hope deferred, peril of death. There yet remained one more trial, to some the sorest of all, namely, that of comparative ease, and the praise of all men. Believing, as the Missionary Society did, that his faith in Christ is firmly fixed, they doubted not he would go through this trial also without fail; but they would, he trusted, continue to offer up constant prayers for him in his new and dangerous position, that the blessing of the Almighty might still accompany him. For himself he would only add, that having had the privilege of presiding at the great missionary meeting which welcomed Dr. Livingstone back to this country at the termination of his unparalleled labours, and having witnessed the enthusiasm which then abounded, it would ever be a subject of the most gratifying remembrance that he had been permitted to take a prominent part upon this scarcely less memorable occasion, and have had the very distinguished honour, for such he must ever call it, of wishing this great messenger of Gospel civilization God-speed, on behalf of the Missionary Societies of Great Britain. (*Applause.*)

The BISHOP of OXFORD.—Mr. Chairman, the toast which has been committed to me is one as to the propriety of which all present have already expressed their opinion; for once and once only to-night there has been expressed a general dissent to an observation of yours, and that observation was that you were not the fittest person to fill that chair. (*Loud cheers.*)

In proposing, therefore, Gentlemen, to you the health of our Chairman, I know that I have with me the universal concurrence of all the members of this great gathering. (*Cheers.*) In truth, Sir, for reasons which connect themselves immediately with our important object to-night, you are the fittest man amongst us to occupy that post. For you as a most distinguished geologist and geographer, and as the head of the Royal Geographical Society, have done more by far than any who have not carefully examined the whole matter

can conceive, both to support our enterprising friend Dr. Livingstone during his arduous undertakings, and finally to crown them with success. (*Cheers.*)

Gentlemen, I need but draw your attention for a single moment to the pregnant words in which Dr. Livingstone has dedicated his recent volume to our Chairman in order to convince you of this. Weigh well these words, "as a token of gratitude for the kind interest he has always taken in the author's pursuits and welfare;" and then remember the simple-hearted, truth-speaking writer from whose pen they flowed, and you will be more able to estimate what were really our Chairman's services in this great undertaking. (*Cheers.*)

Truly it does need the combination of different men and different faculties before any such vast undertaking as this can be achieved. There must be, first, the physical, the intellectual, the moral, and the spirtual faculties combined in one person, which are so eminently combined in Dr. Livingstone, before the actual agent in such explorations can be provided. But then beyond these personal qualifications he must have support from home; there must be the mere physical support, as I may call it, of money, means, ships, companions, goods for presents, and the like; and then, far beyond these, there must be that internal consciousness of possessing the sympathy of hearty, generous, trusting friends at home; that inward stirring of a true national life within the individual; the reflection within himself of the outcoming towards him of the strong national life at home which makes the poet, or the hero, or the great explorer. In how many times of trial, difficulty, and despondency does the stirring of this inward life again invigorate the far-off man in the midst of his lonely wanderings in the desert! (*Cheers.*)

But then the existence of this home remembrance must, in a great degree, depend on there being at home some few who are able and willing generously to keep alive the home remembrance of the absent man and an interest in his work. For at home all things are moving so fast that things out of sight are soon things out of mind. The world round us goes at such speed, its objects, its cares, its pleasures, its amusements, its entanglements, shift and vary with such rapid and endless permutation, that unless there be some "Sacred prophet" evermore at hand to sing to us of the absent, he passes out of remembrance; and this work for Dr. Livingstone was done by our Chairman: from the chair of the Geographical Society, amongst men of science, amongst statesmen, he kept alive the interest which was due to Livingstone and his work. And how well

qualified above other men he was to do this, the rest of that dedication shows: for it embalms the really remarkable fact already alluded to, that our Chairman by his mere scientific deductions had arrived at the true hypothesis as to the physical conformation of the African Continent which Livingstone verified by actual observation. And so, for these discoveries, there were combined the various necessary conditions—(*Cheers*)—the Geographical Society, headed by its President, to solicit the Government to keep alive the interest of the public, and so to support the enterprising traveller. He, too, combined in himself rare faculties for his work of stepping out, if I may so express it, as to African explorations the first track of civilized feet on the dangerous and untrodden snows, which at any moment might be found to have merely loosely covered fathomless abysses. He had the physical strength needed for such work. He had the capacity for understanding the greatness of his enterprise, and, Gentlemen, I believe it to be full of the truest greatness. (*Cheers.*)

You will not think that I speak too strongly when I say that I believe we owe a debt of unparalleled magnitude to our dark brethren dwelling in that great continent. For we, as a nation, were of old the great founders and the great conductors of the accursed slave-trade. Complete at last, thank God! but late as well as complete, was our repentance, and all that we can do we are bound to do to remedy the wrongs we have inflicted. And fearful have they been. How humiliating is it to us in our talk of the onward march of civilization, and of piercing with our discoveries into the heart of African barbarism, to learn from Dr. Livingstone that he can trace by the presence of vice, and crime, and rapine, and distrust, and insecurity of property and life, the very limits of the past intercourse of the black savages of Africa with the white Christians of Europe! (*Cheers.*) For it was not only on the coast line that deep injury was inflicted by that accursed trade; but far within that coast line, wherever the agents of that traffic penetrated, there were contamination and destruction. And how can this evil be undone? Much may be done by our naval squadron, and for doing anything by any means I am convinced that its vigorous maintenance is essential; but the best successes of that blockade can only create the calm necessary for the working of other influences, and amongst the very first, if not actually as the very first, of those influences I esteem the establishment of lawful commerce. (*Cheers.*)

Now, this Livingstone had the grasp of mind to perceive; to see that he should be most effectually opening the way for the

future evangelisation of Africa, if he first opened a path by which lawful Christian commerce could pass and repass into those hitherto separated regions. (*Cheers.*)

Well, but in addition to this he had many other faculties, which all made up together the combination necessary to qualify him to act as the true discoverer of Africa. For, besides what I have named already, he had a clear, shrewd, strong understanding, great simplicity, great power of mastering languages, great courage, great power of influencing others, great gentleness by which he won on their affections, and, above all, he had, to qualify him for his work, downright, straightforward, sterling British truth and honesty. (*Great cheering.*)

For supporting, then, this man as he has supported him, we owe, I think, all thanks and honour to our Chairman, and I call upon you to drink with all the honours long life and happiness to him. (*Loud applause.*)

SIR RODERICK MURCHISON.—In returning you, Gentlemen, my warmest thanks for the flattering reception you have given to my name, and your kind acknowledgment of my services, let me say that I cannot have heard the band play the last air ("The Bannocks of Barley Meal"), preceded as it has been by so many good old Scottish tunes, without my heart overflowing, and being very proud that, like my friend Livingstone, I also am a Scotchman! (*Cheers.*)

I see indeed with pleasure sitting not far from me another Scotchman, the late Lord Mayor, Alderman Finnis, and near him Alderman Wire, both of whom were foremost in the good cause of welcoming our great traveller on his return, and in conferring on him the proud distinction of the freedom of the City of London.

But I pass from the personal considerations with which, in terms of much higher praise than I deserve, the Bishop of Oxford has been pleased to speak of my efforts in science, to the grand theme of the day, which his Lordship has illustrated with such fervid eloquence, and, if possible, still more to connect that theme with the special object of our present happy meeting. I will therefore just add this one phrase. I have before adverted to the wondrous exploits of Livingstone as a geographical traveller, and also to his noble moral bearing as a missionary; but I have still to point out one of the brightest features in his character when I say, that notwithstanding eighteen months of laudation so justly bestowed on him by all classes of his countrymen, and after receiving all the honours which the universities and cities of our country

could shower upon him, he is still the same honest, true-hearted David Livingstone as when he issued from the wilds of Africa. (*Loud and protracted cheering.*)

PROFESSOR OWEN.—I rise to express the pleasure with which I avail myself of the opportunity I am favoured with of publicly acknowledging the deep sense of the obligation which, in common with all men of science, and more especially the cultivators of natural history, I feel towards the distinguished traveller we have this day assembled to honour. (*Cheers.*)

During the long and painful journeyings by which the great geographical discoveries were made that place the name of LIVINGSTONE among the foremost in that science — though harassed by every difficulty, enfeebled by sickness and encompassed by dangers—in perils of swamps and waters, in perils of noxious and destructive beasts, or of crafty and hostile men—yet no phenomenon of nature, whether meteoric or living, appears to have escaped the clear glance and self-possessed cognition of the determined explorer. (*Loud cheers.*)

In regard to zoology, I must state that I never perused the work of any traveller from which I had to take, from the same number of pages, so many extracts of new and original notices of the living habits of rare animals, as from the volume of African travels of which Mr. Murray now announces the "Thirtieth Thousand." In this work the South African colonist and the entomologist are alike benefited by the most precise and authentic evidence yet obtained of the terrible tsetse-fly, and its fatal effects on the ox, horse, dog, and other animals indispensable to colonising progress. The scientific staff about to accompany Livingstone in his second exploration of the Zambesi will doubtless, aided by his experience, clear up all the mystery of this most extraordinary property attributed to an insect no bigger than the house-fly. In the same unpretending volume we find a rich store of new facts in natural history, told with the charm of direct transcript from nature, and with the raciness of original power, and that humour which is so often the concomitant of great and simple minds. In regard to the singular economy of the ants and termites, with what interest we read of the unhooking of the wings by the insect itself after the nuptial flight, when the bride, her one holiday-excursion ended, lays down her "limber fans" of glistening gauze, and betakes herself henceforth to the duties of domestic life,—of the untiring activity of the workers, under the scorching sun, which unwearied-

ness the deep-thinking Traveller illustrates by comparison with the beating of the heart, perhaps unconscious of the profound physiological truth embodied in this comparison of insect movements with the involuntary or reflex muscular action in higher animals! How mysterious seems that power of most rapid diffusion of a subtle penetrating effluvium, which Livingstone notices as the defence of certain ants, with experimental determinations of distance and rate of progress of the emanation! (*Applause.*) The same faculty of exact inquiry is manifested in the experiments, which remind us of those of Hunter—born, like Livingstone, in the parish of Kilbride—by which our traveller determined the independent source of the fluid secretion of the tree-insect, from which it dripped in such extraordinary quantity, both whilst attached to the twig and when insulated from its sap-vessels. The ornithologist has wondered at the seeming monstrous beaks of the hornbills, little dreaming of that strange economy manifested in the voluntary imprisonment of the incubating female, plastered up with her nest in the cleft of a tree, a fissure only being left through which she can protrude the tip of her long bill to receive food from her attendant mate, and he, reciprocally, poke his into the procreative prison to tempt her with some dainty. (*Applause.*)

Of the ostrich much has been written; yet we wanted Livingstone's testimony of the vocal power of the wild male, roaring like the lion, and only, as our traveller tells us, distinguishable by being heard in broad day instead of by night. (*Continued applause.*) Of the king of beasts himself the volume contains the richest storehouse of facts, from direct and varied observations of him in his native wilderness.

Perhaps, however, this is the part of our friend's book that has failed to give unmixed satisfaction to the British public. We dislike to have our settled notions disturbed by provokingly unvarnished, uncompromising assertions of facts that militate against a cherished prepossession. Some of us feel rather sore at our notions of the majesty of England's old emblematic beast being upset by the sum of our guest's opportunities of intimate acquaintance with the natural disposition and habits of the lion of South Africa. (*Laughter.*) Fearfully intimate, indeed, was part of his experience! That direful grip—which since has left one arm a dangling appendage—when the dishevelled mane of the irate monster was tossed about his victim's head, and the hot breath driven with deafening roar into his ear!—did it shake all respect for the traditional nobility of the lion out of the Doctor's mind? Certain it is, the sum of his recorded observations shows the lion to be a

slothful, skulking, cruel beast of prey,—by no means the psychical compound we have delighted to associate with our national emblem. (*Laughter.*) Perhaps, however, I have a word of comfort for those who would still glorify its type. Species differ in habits. The British lion is not a mere heraldic monster, but was once a grim flesh-and-blood reality. I have had the satisfaction of determining that the *Felis spelæa* of our Yorkshire, Somersetshire, and Devonshire bone-caves was a veritable lion, surpassing in bulk, and with paws of twice the relative size, of those of the largest living lion of North or South Africa. The old British species has passed away—at least he now only shakes his mane and roars in metaphor (*continued laughter*); but the extinct antetype may have possessed all the qualities which his most ardent admirer would have ascribed to him. (*Cheers.*)

It is hard for the naturalist, when on his favourite topic, to forbear gleaning from Livingstone's full and rich storehouse of facts about buffaloes, rhinoceroses, elephants, and so forth. But the hour reminds me that time has fled apace—quickly because so pleasantly.

Our excellent Chairman has pointedly adverted to one quality in Livingstone—his inflexible adherence to his word. (*Cheers.*) It is shown in small as well as great things. When, eighteen years ago, the young missionary was preparing himself for his task, he devoted part of his short leisure in London to studying the series of comparative anatomy in the Hunterian Museum, then under my charge. On taking leave of me he promised to bear me in mind if any particular curiosity fell in his way. Such an one did in the course of his Zambesi travels—the tusk of an elephant with a spiral curve. It was a heavy one; and you may recall the difficulties of the progress of the weak, sick traveller, on the bullock's back. Every pound weight was of moment; but Livingstone said, "Owen shall have this tusk," and he placed it in my hands in London. (*Loud cheers.*)

In the perusal of the Missionary's Travels it is impossible not to infer the previous training of a strong and original mind richly and variously stored; not otherwise could science have been enriched by such precious records of wanderings in a previously untrod field of discovery. Our honoured guest may feel assured that whilst the cultivators of science yield to no class of minds in their appreciation and reverence of his dauntless dissemination of that higher wisdom which is not of this world, such feelings enhance their sense of obligation for his co-operation in the advancement of that lower wisdom which our great poet defines as "resting in the contemplation of natural causes and dimensions." (*Applause.*)

Every man to whom it has been given to add to human knowledge looks back with grateful feelings to the school or college where he acquired his elements of the sciences. With the same feeling that Livingstone may recall the old lecture-halls at Glasgow, so do I those of Edinburgh. We may both rejoice that the natural sciences have always had so large a share of the teachings in those Universities. At the same time we cannot forget that we have both been honoured by a degree from the oldest and most classical University of England.

It is, therefore, with every sentiment of gratitude and respect that I propose the toast which has been allotted to me,—"The Universities and Scientific Bodies which have united with the Geographers to honour Livingstone." (*Loud cheers.*)

The BISHOP of ST. DAVID'S said, that nothing but a sense of duty, the duty of submission to the authority of the Chair, could have reconciled him to the seeming presumption of his standing up in that place as a representative of the Universities, and especially in acknowledgment of a toast proposed by one who ranked among the foremost of the princes of modern science. He was conscious that he had no claim to such a character but the obligations under which he lay, in common with multitudes, to one of those learned bodies. He believed, however, he might say of them, that they were doing their duty, and that there never was a time when they had been more alive to the importance of the functions with which they were entrusted, and more earnestly bent on discharging them faithfully. He would add, that they would have missed one of their highest ends if they failed to inspire those who received their training with an intelligent interest in the expedition which was about to leave our shores. (*Cheers.*)

From that expedition, notwithstanding the cautionary hints which had been so prudently thrown out, he augured the happiest results—commercial, scientific, and social. But still, however precious and brilliant those results might be, he was sure that they could not outweigh the worth, or outshine the lustre, of Dr. Livingstone's past achievement, by which he had shown the ascendancy which might be gained over uncivilized tribes by a superior intelligence, animated and guided by the principles of Christian charity. (*Cheers.*)

If anything could heighten their admiration of that great moral triumph, it might be a comparison with an expedition which had been sent out, not many years before, in another part of the same continent. The expedition to which he alluded was

sent by the Pasha of Egypt to discover the sources of the Nile. Its history had been related by a Frenchman (M. Thibaut), who accompanied it. It consisted of several barks with troops on board, and was amply supplied with all the resources which the power of the Pasha could furnish. It first passed through the territories of a warlike race, which was treated with prudent respect. Afterwards it came to those of a tribe which had not been reached by any previous voyage of discovery. The natives crowded the banks to gaze on objects which they had never beheld before; the spectacle impressed them not merely with wonder, but with awe; they regarded the strangers as beings of a superior nature; yet the brutal soldiers of the Sudan were permitted, and even instigated, to fire upon these unoffending, almost worshipping, creatures, plundered and burnt their habitations, and carried away their women and children, to be sold as slaves in the market-place of Khartum, the point from which the expedition started. Could any discovery compensate for the evil which must be caused by such a mode of exploration as this? Must not the people who had been so treated ever after associate the idea of superior civilization with injustice and oppression, robbery and wrong? And must not this contrast heighten their admiration for the traveller who had pursued so directly opposite a course, in which those who came after him could have no higher aim than to tread in his steps, and to approach, at a respectful distance, his illustrious example? (*Cheers.*)

The DUKE of WELLINGTON proposed the health of the Ladies, and especially of Mrs. Livingstone, in a few words complimentary to that lady. (*Drunk with warm cheers.*)

SIR RODERICK MURCHISON.—I now give you the last toast of the evening, and beg you to drink to the good health of the "Proposers of this Festival."

The zealous geographers who sit at the ends of the seven cross tables are the gentlemen who have mainly contributed to make this meeting as harmonious, gratifying, and successful as it has been. (*Cheers.*)

To those good men let us return our sincere acknowledgments, and above all to Dr. Norton Shaw and Mr. Arrowsmith, for the heartiness with which they have gone to work to bring about this farewell festival to Livingstone.

I now therefore call on Dr. Norton Shaw, the untiring promoter of every movement calculated to support geographical science, to answer for this our parting toast. (*Cheers.*)

DR. SHAW, in the name of his brother stewards and himself, having returned thanks for the compliment which had been paid them, the meeting separated.

CRAWFURD'S DICTIONARY.

A Descriptive Dictionary of the Indian Islands and adjacent Countries. By JOHN CRAWFURD, F.R.S., F.R.G.S., etc.

THIS is a work very much in the same style as the *Oesterreichische National Encyclopädie*, in which all that relates in any important degree to the region to which it refers—geographical, biographical, zoological, historical, commercial, &c.—is arranged in an alphabetical manner. Thus, to instance the very first pages, we find Abaca, Abany, Abra, Achin, Adang, Agar-agar, Agila, Agno-Grande, Albay, Alboqurque, Alforas, Alligator, Ambergris, Amboyna, &c., names immediately or nearly succeeding each other as heads of so many articles. Elsewhere we find Dog, Dory Harbour, Dragon Blood, Drama, Dress (of the inhabitants of the Indian islands), Philippine Archipelago, Pigafetta, Pilgrimage, Pine-apple, Piracy, Polo (Marco), Polynesia, &c. These headings will sufficiently indicate the general scope of this Dictionary and its very comprehensive character. It appears to embrace considerations on every subject connected with that vast and interesting region, which extends from the Bay of Bengal to the northern shores of Australia, and comprises the largest islands on the surface of the globe. It has often occurred to us that a "British" National Encyclopædia, on a plan similar to that of the Austrian, or to the work before us, relating to every portion of territory under the British crown—its geography, productions, history, and celebrated natives—might be invested with the highest interest. On the face of the earth there cannot be found a dominion comprising regions so varied in character or more abounding in natural wealth, rich seats of commerce, valuable antiquities, and a history full of remarkable events, than that empire under which we live, and upon which the sun never sets.

The qualifications of Mr. Crawfurd to produce such a work as this "Descriptive Dictionary," &c., are undoubted. Thirty-six years ago, when (as he tells us in his preface) he gave to the world his "History of the Indian Archipelago," if we except Sir Stamford Raffles (under whom he filled an official appointment in Java), Mr. Crawfurd was nearly the only authority for most information concerning that previously little-known region. Since that period, Hogendorp and some other Dutch authors have made public statements respecting the Dutch possessions in the East; and, particularly in recent years, the names of Swart, Croockewit, Schwaner, Keijser, Müller, &c., appear as authors of written works or maps to be found in our own library. Megen in the Philippines, Sir James Brooke in Borneo, and Windsor Earl in the Eastern and South-Eastern part of the Archipelago, together with a few other travellers; our own Hydrographic Office; the Royal Institution for the Language, Geography, &c., of Dutch India; the Journal of the Asiatic Society of Bengal,

a few Parliamentary Reports; the Singapore newspapers, and especially the Journal of the Indian Archipelago, edited by Mr. Logan, have contributed further information respecting different parts of this vast region. But no one that we are aware of, excepting Mr. Crawfurd, has ventured upon the labour of producing a systematic and comprehensive work on the subject, such as his 'History of the Indian Archipelago' and the volume before us. Doubtless the author has availed himself of all the foregoing sources of information, in addition to his personal knowledge of this part of Asia, and the researches which he had already made previously to the appearance of the works above indicated; and the result is a *catalogue raisonné* in reference to the islands of the Eastern Seas and adjacent countries, which ought to find a place in every geographical library.

As might be expected, the countries personally travelled in by Mr. Crawfurd are those which he has treated of at the greatest length. It is well known that he was more than thirty years ago a special envoy from the British Government to the courts of Anam and Siam, and on behalf of the British Sovereign concluded the treaty with the Burmese after the invasion of the empire of Ava in 1826. Accordingly, he has introduced into the Dictionary lengthened articles on Siam, Cochin China, and the adjacent countries, respecting which he is certainly one of the chief authorities, or we might more properly say, our principal and most trustworthy informant. He has also given a very extended and valuable account of the important island of Java, where he resided and held a distinguished position under Sir Stamford Raffles during its occupation by the British from 1811 to 1816; and he has treated to an adequate extent of Singapore, in which thriving settlement he is, we believe, a landed proprietor, and in which he succeeded Sir S. Raffles as governor.

We shall enter into no disquisition on the ethnological researches of our author, as with some of his conclusions many readers may not feel inclined to accord; but we cannot overlook the acuteness and value of some of his etymological remarks with which the Descriptive Dictionary is abundantly interspersed, and which our learned fellow-member is rendered highly competent to make, by his knowledge of some of the living languages of continental India, where Mr. Crawfurd resided for a considerable length of time.

In several of the articles old and long-persistent errors are for the first time corrected. Thus, for instance, the island known in maps as Gilolo, is described by Mr. Crawfurd under the name of "Almahera," as its proper appellation—Gilolo, or Jilolo, being merely the name of a bay and of a kingdom on the western side of the northern limb of the island in the time of the early Portuguese writers. On another hand unwarranted innovations are exposed. The name of Tanah-Kalamantan, or "Land of Mangoes," which has of late found its way into some books as applied at large to the great island of Borneo, is stated by Mr. Crawfurd to be only a Malay term, and a mythic, and neither a popular nor well-known name for that country.

Mr. Crawfurd, in many parts of this work, vigorously denounces the "violations of the sound principles of commercial policy" (p. 191), which, prompted by rapacity, the conquering European nations, the Portuguese, Spaniards, English, and Dutch, have more or less adopted in the Indian Archipelago. The production of its great staples—rice, spices, tin, &c.—has, as he shows, been fettered and cramped by the most narrow-minded and tyrannical regulations. As respects the clove, for example, and the periodical destruction of the trees producing it in islands beyond the Dutch dominion, Mr. Crawfurd remarks, "The Dutch Government has only to pursue a course exactly the reverse of that which it has followed for two centuries and a half, and it will be right. . . There seems no good reason to doubt that the consumption of cloves might, with equal cheapness and freedom, become co-extensive with that of pepper" (pp. 104-5). With respect to the production of tin in Banca, the author

adduces arguments against an ill-judged policy of a monopoly of the produce; and as to the general principles which have guided the European nations as regards the Eastern Archipelago generally, he says (p. 20), "All the four nations, for three long centuries, acting on a false and rapacious commercial theory, in so far as that theory is concerned, may safely be said to have marred, instead of promoted, the industry and civilization of the native inhabitants; and it is only within the present century that a wiser and more generous policy, not fully carried out by some of the parties even now, has been adopted." This stricture, founded as it is upon a personal acquaintance with the countries in question, is anything but creditable to Christian nations.

Some curious details are given under the head of "Krama," which is the name of the "polite dialect," or "ceremonial language" of the Javanese. In this idiom it seems that the great object to be attained has been the avoidance of all words and forms of expression to be found in the vulgar tongue. If a word should have become familiar, it is rejected from the ceremonial language. It is as if in our own country we were always to use words derived from the Greek, Latin, or French, in preference to those of Anglo-Saxon origin, and which are popularly understood—a practice which is not unknown under the latitudes and longitudes embracing the British islands. The general prevalence of such a dialect would tend to prove the correctness of the axiom attributed to Talleyrand—that language was given to man not so much to express his thoughts, as to hide them in obscurity.

Under the head "Grobogan," which is the title of an ancient kingdom, and now of one of the districts of Java, Mr. Crawfurd, on the authority of Dr. Horsfield, gives us an excellent description of the remarkable phenomenon of a mud-volcano. The author is wrong, however, in instancing it as "singular," since a similar expulsion of mud from beneath the surface of the earth takes place at Maccaluba, in Sicily, and is well described by Captain Smyth in his valuable work on that island. In treating of Papandayang, also in Java, Dr. Horsfield (Dict., p. 327) has stated that this, which was formerly one of the largest volcanoes in the island, was for the most part swallowed up in the earth in 1772, an extent of high ground, fifteen miles in length and fully six broad, being thus engulphed. Such an event is obviously exactly the converse of the elevation of the volcano of Jorullo, in Mexico, in 1759, as described by Humboldt,* and of some subsequent upheavings of volcanoes in Central America. Next to the upheaving of Jorullo, which is unquestionably the most stupendous natural phenomenon, of which we have any record, that has occurred during the historical period, may be instanced as amongst the marvels of nature the vast eruption of the volcano of Tomboro, in the Indian Archipelago, in 1815.

* A concise account will be found in M'Culloch's Geog. Dict., ii. 91.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1858.

Fifth Meeting, Monday, January 25th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

ELECTIONS.—*Captain Howard C. Elphinstone*, R.E.; *Thomas Joseph Hutchinson, H.B.M. Consul, Bight of Biafra, Lieutenant-Governor of Fernando Po, &c.; Robert Moffat, Government Surveyor, Cape of Good Hope; Dr. Ferdinand Mueller, Botanist and Explorer of Tropical Australia; Thomas Witlam Atkinson, author of 'Travels in Oriental and Western Siberia;' and George Bishop, Jun.*, F.R.A.S.; *Edward Burmester; Isaac Gregory; Arthur Boutcher Halloran; Thomas Woodbine Hinchliff, and Charles Edward Lefroy, Esqrs., were elected Fellows.*

EXHIBITIONS.—Among the articles exhibited at the meeting were Sketches, by Mr. Th. Baines, of the North Australian and South African Expeditions; Original Tracing, by Captain W. Allen, R.N., of the Niger; Photograph of the steamer "Dayspring," recently lost up that river; Reduction of Lieutenant Glover's Chart of the Niger; Specimens for a Submarine Telegraph Cable, by M. Ballustrini.

DONATIONS.—The following were among the donations since the previous meeting:—'Summer Months among the Alps,' by T. W. Hinchliff; 'Annales de l'Observatoire Physique Central de Russie;' Blackie's 'Imperial Atlas;' the 'Transactions of the Geographical Society of Bombay;' and Charts from the Hydrographic Office of the Admiralty, &c.

ANNOUNCEMENTS.—The President stated that he had received from the Hydrographer information to the effect that the "Sunbeam," with a fresh supply of instruments, presents, and other articles, had sailed the day before from Liverpool for the Niger, to replace the "Dayspring," lost near Rabba.

The Papers read were :—

1. *Progress of the British North America Exploring Expedition, as far West as long.* 109° *on the Lower Saskatchewan River.* By Captain JOHN PALLISER, F.R.G.S.

Communicated by the Rt. Hon. H. LABOUCHERE, M.P., F.R.G.S., H. M.'s Secretary for the Colonies.

Montreal, Canada East, 8th Dec., 1857.

SIR,—In continuation of my Report of the 27th July, 1857,* I have the honour to inform you of the farther progress of the British North America Exploring Expedition.

On September the 28th I arrived at San Josef, an American town about 7 miles south of the British frontier line. The population consists of British as well as American half-breeds, whose chief dependence is on the proceeds of the buffalo hunt; and, while the more youthful part of the male population are away on the hunt, the then defenceless inhabitants are subject to the inroads of the Sioux Indians. These Indians last year attacked that settlement, stole almost all the horses, and shot a woman and the schoolmaster: indeed, hardly a year passes without some similar depredations. Although that bend of the Pembina River, on which San Josef is situated, is inside the United States' territory, yet the greater part of the river's course is through the British dominions. It is an important river, and may hereafter prove valuable, as affording facilities for navigation. I have, therefore, had its course correctly laid down in our charts.

On the 4th August we reached Turtle Mountain, a hill rising out of the prairie to about 300 feet; it is 30 miles long, 10 broad. This hill is one of a series that we have since traced scattered irregularly in a line from south-east to north-west. The boundary line passes through the summit of this mountain, throwing the "Souris" or Mouse River into the British possessions. This river has hitherto been wrongly laid down in all maps; and I have, therefore, also paid strict attention that its course should be carefully laid down in our charts.

August 15th.—We reached Fort Ellice on Beaver Creek. Here I found the men I had sent direct from Fort Garry with the ten horses, and, as they had now rested more than a week, I took these ten horses on an expedition to "La Roche Percée," leaving the horses, that had been hitherto travelling with myself, to recruit.

Proceeding on a south-west course from Fort Ellice, we arrived on the 18th of August at Moose Mountain, one of the chain of hills

* *See* Proceedings, No. I., vol. ii.—ED.

above mentioned. It, like the Turtle Mountain, is covered with dense woods, lakes, and swamps.

On the 20th August we arrived again on the Mouse or "Souris" River, and here Dr. Hector first discovered coal of a very fair quality. From this point of the Mouse River an hour's ride brought us to the "Roche Percée." A singular appearance is here produced on the rocks and stones by the combined action of the atmosphere and water; the layers of sand and clay forming these, being unequal in hardness, are worn accordingly into grotesque shapes, affording more astonishment to the Indians and half-breeds visiting the spot than interest to the geologist on a more close examination.

Here I was visited by a large number of Stone Indians, celebrated as the greatest horse-thieves in the country: however, I concealed all apprehension for my horses. I also discovered that meat was a very scarce article among them, as they had not fallen in with buffalo for many days. I had, however, been fortunate enough to kill two bulls that morning, and secured their good offices and the safety of my horses by giving them the meat, inviting them to cook and prepare their own feast, to which I added some tea, sugar, and flour, desiring them in return to guard my horses all night, which injunction they regarded as a compliment, and faithfully performed.

The following day we returned, and reached Fort Ellice on the 25th of August.

On examining the horses I had left behind at this post when I started for "Roche Percée," I found them not sufficiently recruited to proceed westward to the Elbow: I therefore determined to wait a few days longer. I likewise found that my guide and interpreter was so frightened at the prospect of entering the Blackfoot country, that he gave me very false interpretation as to the facilities of the route I intended (according to my instructions) to adopt. I therefore started a messenger to Mr. Christie, the chief officer of the Hudson Bay Company, requesting the services of Mr. M'Kay (the officer in charge of Fort Ellice) as an interpreter to accompany me on the expedition. Mr. Christie, on receiving my letter, rode three days' journey to meet me at Fort Ellice, and brought with him a gentleman to put in Mr. M'Kay's place, thereby placing the valuable services of the latter at my disposal. In the mean time, on the 7th of September, finding my horses sufficiently rested to resume operations, I started the expedition under Dr. Hector for the "Qui Appelle" lakes, and remained behind at Fort Ellice until I should see or hear from Mr. Christie, whose subsequent arrival on September 9th, set Mr. M'Kay at liberty; and, after accounts were

made up and transferred, I started on horseback, accompanied by M'Kay and two of my men (who had remained behind for the purpose), and overtook the expedition in three days at the Qui Appelle lakes, about 135 miles west of Fort Ellice.

On Sunday, September 13th, we remained at the Qui Appelle lakes. Here the Hudson Bay Company have a small trading-post, the most western fort in the territory; and there we found a large camp of Crees arrived for trading. I sent for Mr. Pratt, the missionary, requesting him to come and pay us a visit. He is a pure Cree Indian, educated at Red River. He reports the Crees as beginning to apprehend scarcity of buffalo, and many are most anxious to try agriculture. He thinks that if they had agricultural implements, such as spades, hoes, and ploughs, they certainly would commence operations. This opinion I found pretty general among the people of the Hudson Bay Company; and I am persuaded much good could be done by importing the simpler kinds of agricultural implements. Pratt has set the Indians an excellent example himself, and grows capital Indian corn, barley, and potatoes. The Qui Appelle lakes may be considered the most western part of the territory east of the Rocky Mountains to which the Hudson Bay Company trade: westward of this I may say is unknown, and the whole country in this latitude is untravelled by the white man.

Among the Indians that had come to trade was a man Mr. M'Kay was acquainted with. This man was a remarkable exception to the generality of Indians: they call him the "peace-maker," and twice within the last two or three years he pushed his way alone into the Blackfoot country, and walked into the enemy's camp unarmed, with the peace-pipe in his hand, exhorting them to peace, and offering them the alternative of killing him. The result on each occasion was a treaty of peace to the Crees and a present of horses to the peace-maker. I engaged this Indian to guide us to the Elbow.

On September the 14th we started from Qui Appelle lakes for the Elbow, on the south branch of the Saskatchewan, sometimes called the Bow River. On September 16th we again camped on Mouse or Souris River, at a tributary called by the Indians, Moose Jaw Creek, in longitude 106°. Up to this point in our journey we had suffered no inconvenience from want either of wood or water; here, however, our guide, the peace-maker, advised us to bring wood along in our carts, as we should see no more until we came to the Saskatchewan, which we first came in sight of at sunset on the 21st of September.

We were now in the heart of the buffalo country. This region

may be called a buffalo preserve, being the battle-ground between the Crees and Blackfeet, where none go to hunt for fear of meeting enemies, and where those who go to war abstain from hunting. The whole region, as far as the eye could reach, was covered with buffalo, in bands varying from hundreds to thousands. So vast were the herds, that I began to have serious apprehensions for my horses, as the grass was eaten to the earth, as if the plain had been devastated by locusts. However, the timber on the small tributaries of the river kept off the buffalo, and so a little grass was obtained for the horses, for the buffalo shuns the timber until mid-winter.

At the Elbow I found a large tributary flowing from the east into the Saskatchewan, and I dispatched Dr. Hector with one or two men to trace the course of this river, which I find flows from the most western of the chain of Qui Appelle lakes, being navigable to large boats the whole way. Hence I have been able to ascertain that there exists a valuable water communication between the south Saskatchewan and Red River, and that a good-sized boat, and even a small steamer, might descend from the south Saskatchewan, ascend to the west Qui Appelle river, cross the Qui Appelle lakes, and then descend the Qui Appelle into Red River.

After the Doctor's return from exploring the western Qui Appelle, we commenced our ascent from the Elbow, and reached the 109th meridian of longitude on the 28th of September. This magnificent river rivals the Missouri in size and volume, and even at this (the lowest state of water during the whole year) was navigable for craft of any size, as I found by sad experience, having been so unfortunate as to lose one of my waggons in the channel of the river at a depth of sixteen feet, where I subsequently crossed it. All particulars of this river—its timber, capabilities, &c.—will be found in my journal, which I hope to have the honour of forwarding to England next spring. The 109° meridian is the farthest point to the westward that I have this season explored. At this point I crossed the river to the north side, and started on a north-east course for Carlton, my winter quarters, where we arrived on the 8th of October.

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I started from Carlton (Upper Saskatchewan) October 11th, reached Touchwood Hills October 15th, Fort Pelly October 18th, Fort Ellice October 23rd, and on the 1st of November arrived at Red River. This portion of my journey was very cold, accompanied with snow almost every day, yet not sufficient to delay me or cause me much inconvenience. At Red River I found very great

difficulty in obtaining horses and a guide to Crow Wing, Minnesota territory, but at length succeeded, for the sum of 65*l.*, in obtaining the services of a half-breed named Robert Tate, and his horses, to take me there, a distance of about 520 miles. For this sum I was supplied with a horse to ride, besides the horses necessary to carry our baggage, bedding, and provisions. Unfortunately my horse was killed at Pembina, and I had to go on foot about 450 miles of the way: the snow, however, was so deep, and the weather so cold, that it did not much signify; and we arrived at Crow Wing on the 19th of November.

From Crów Wing there is stage conveyance to St. Paul and Prairie Le Chien, partly by coach and principally by waggons and sleighs. At Prairie Le Chien is the railway terminus, from which I proceeded *viâ* Chicago and Detroit to Montreal.

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While I was at Red River on my way to this, I made my arrangements for proceeding next spring with the expedition, by engaging twenty men, and ordering them to proceed on the 10th of March, 1858, with a sufficient number of dog-sleighs to convey their provisions up to Carlton House, in order that all may be in readiness for as early a start as the season will permit. My course will be, in the first instance, to visit Eagle Hills, and thence to strike for the south branch of the Saskatchewan, and renew my explorations at that point where I left off at the end of September. I regret that I am obliged to engage so many men, as their pay and small rations will increase the expense of the expedition; but with a smaller number it would be the height of imprudence to venture into the south-western part of the Blackfoot and Peagan country. A smaller number would only invite the Indians to attempts on the horses. It is true I have hitherto only travelled with thirteen men, but the Indian camps I have met (with one exception, at Roche Percée) were small ones; next year the camps I shall fall in with will be much larger, and to meet this I must increase the number of my men to thirty in all, viz., four men at Carlton, one man at Red River still under pay, five at Carlton to commence pay on April 1st, 1858, at 15*l.* for six months, and twenty from Red River to commence pay March 10th, 1858, at 20*l.* for six months. After this dangerous country shall have been traversed, much fewer men will suffice, by returning to the settlement on the Hudson Bay Company's beaten track, *viâ* Edmonton. But the country the expedition will have to traverse next year, in order to fulfil its objects, will be so dangerous, that it would be impossible to fulfil my orders

of sending the expedition back in time to reach St. Paul in the fall of 1858.

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The PRESIDENT.—You will agree with me, Gentlemen, that Captain Palliser is admirably qualified for such a difficult enterprise as the one he is proceeding on. He is a capital buffalo hunter, thoroughly inured to everything that a man can suffer in North American travel, well practised in all the sports of the country, and a man of great strength and endurance. I am sure he will realise all those objects which the Royal Geographical Society had in recommending him to Her Majesty's Government. I am in hopes that next year this expedition will proceed towards the Rocky Mountains, and come into direct communication with the other expedition under Captain Hawkins, R.E., which the Government is about to send out to explore the boundaries between the United States and the British territories. We have among us on the present occasion gentlemen who are acquainted with this territory, and among them my old and distinguished friend Mr. Featherstonhaugh, who, with Colonel Mudge, was employed on that frontier in 1846.

MR. FEATHERSTONHAUGH.—I did not know on entering the room that this Paper was to be discussed; but Sir Roderick having called upon me, I rise to observe that I have been at various times in different parts of the country laid down in the map, but have never penetrated west of Lake Winnipeg, in the direction of the Rocky Mountains, where Captain Palliser proposes to go next year. I have, however, crossed from the Mississippi to Red River, and thence to its junction with Lake Winnipeg. Lord Selkirk planted a colony of Scotchmen at Pembina: those I saw appeared to me to be industrious and meritorious men, fitted to contend with a rigorous climate, and who by ingenuity and economy could flourish in despite of it. They had ploughs and other agricultural implements, and had barns full to repletion with barley, but could get no market for it. The potatoes were excellent; I never ate better. Beef cattle they had not as yet, as they could supply themselves with buffalo meat. Hereafter they will have cattle; for where you can have barley and potatoes you can have domestic animals. Some of these men spoke to me of the coal they had found in the neighbourhood; and, as an old geologist, I should certainly have gone to the locality, but winter was at hand, and I was obliged to hasten out of the country.

Before I take my seat I will, if I am permitted, briefly allude to some considerations of a more general character. It is known that, under the dominion of Great Britain, in North America, there is a vast region, extending from the United States frontier north, and from the Atlantic to the Pacific. This immense territory, including the Canadas, Labrador, and the possessions belonging to and frequented by the Hudson Bay Company, is much larger than the United States. This expedition of Capt. Palliser, sanctioned by Her Majesty's Government, and so cordially encouraged by the Royal Geographical Society, leads naturally to the discussion of a question of great public interest, viz., whether this imperial domain is capable of sustaining an industrious population? For several degrees beyond the most northerly part of the frontier of the United States this question may be answered in the affirmative. In the valleys I remarked a great fertility of soil, proper to the cultivation of barley, oats, a peculiar kind of Indian corn that ripens in eight weeks, called Mandan corn, and potatoes. Nothing is more nourishing to cattle and sheep in the winter than the sweet fodder of Indian corn. Farther north the short summers are not favourable to cultivation; but wherever settlers are in possession, they will soon find their way to the deposits of copper and other valuable minerals; and such is the facility of water communication, that these will in time be brought to the settlements and exchanged for provisions

and other necessaries with the inhabitants to the south, living in milder latitudes. I look upon this exploring expedition of Capt. Palliser as highly meritorious; it will open up a territory of whose physical geography and intercommunication and juxtaposition of streams we are at present ignorant, but the knowledge of which will be hereafter highly useful.

With reference to the approaching extermination of the buffalo, the Indians are to blame. Ever since white traders went amongst them, they kill the buffaloes wherever they meet them—not for food, but to sell their skins. In prairies 160 miles in extent I have seen in every direction skeletons of buffaloes slain in this destructive manner.

I desire to conclude these remarks with my conviction, derived from a long experience of the progress of mankind under nearly similar circumstances, that industrious colonists in those regions would in time establish a regular and profitable commerce favourable to the interests of Great Britain.

COLONEL LEFROY, F.R.G.S.—I only rise for the purpose of adding my testimony to the valuable contribution to our knowledge of that region which has been given us by Mr. Palliser: one more substantial than we have had from any other source for a long period. I leave to geologists to estimate the value of the discovery of coal, which I have a vague recollection of having heard of when I was in the country. But what impressed me most was the discovery of a navigable water communication between the Saskatchewan and the Red River by means of the Qui Appelle waters. They seem to traverse a large extent of country, and if the discovery be substantiated, will greatly facilitate our means of communication with those western regions towards the Rocky Mountains; but it will hardly be safe to assume that the depth of water found by the travellers where they sounded is to be met with generally along them, the Saskatchewan itself being full of shallows. I differ from many as to the destination of that region with regard to the support of an increasing population. I am one of those who think it never can support a dense agricultural population, or one in any degree comparable with that of Canada. But there is a fact mentioned by Mr. Palliser which struck me: it is that he found Indian corn ripe at Fort Ellice. I believe Indian corn has not been found to ripen with any certainty on the Red River. It is a very interesting point to find within the limits of the British territory a region where it will do so. With regard to the abundance of buffaloes spoken of, it was mentioned to me as a positive fact by Mr. Heriot, that a brigade of boats was delayed three whole days in going up the river in consequence of the immense herds of buffalo crossing the stream. This was in 1841 or 1842. In all these respects Mr. Palliser's account agrees with our previous information, and he has added to it most materially. It must be gratifying to this Society to have been the means of sending out a traveller so observant and intelligent.

The PRESIDENT.—I may observe, with reference to this expedition, that Captain Palliser is accompanied by two or three men of science of considerable distinction. Dr. Hector is a good naturalist and geologist; Mr. Sullivan is a gentleman capable of making physical and astronomical observations; and our Associate Lieutenant Blakiston is making all the magnetical observations. So that we may hope for considerable additional results. The main feature of the present communication is the discovery of this remarkable water-shed, proceeding from the Qui Appelle lakes—the waters flowing both to the east and west. It was previously unknown to geographers, who must see the importance of this discovery, as regards the future destiny of that country, in the facility it may afford for the transport of merchandise to and from the interior.

The second Paper read was :—

2. *Description of the Amúr River in Eastern Asia.* By M. A. PESCHUROF, of the Imp. Russian Navy.

Communicated by Capt. JOHN WASHINGTON, R.N., F.R.G.S., Hydrographer.

[This Paper will be printed in full in the Journal, with a Map.]

THIS account of the Amúr is little more than a picturesque description of its banks, for it is accompanied by few data of any scientific value. This great stream, of 1500 miles in length, is traced from its origin in the two rapid rivers, Shilka and Argum, whence it forces its way through the spurs of the mountain-chain which borders it, whose flanks are dotted with the remains of larch, fir, and white willow, that have been stripped and felled by the nomad tribes, for their encampments. Its banks are mossy rock, almost destitute of earth, and at every valley a copious rivulet runs in. The Amúr valley widens out as the beautiful meadow lands are reached, on which the ruins of the ancient Cossack town, Albazin, are situated. (Albazin was besieged and taken by the Chinese in 1686, and subsequently demolished according to treaty.) Numbers of islands, now increasing to archipelagos, give a peculiar feature to the river, and the birch begins to appear near to the confluence of the Kamara river. This is the head-quarter of the nomad tribes, for the banks of the Kamara abound with fur animals, and the people, near its confluence with the Amúr, cut wood and float it down the latter river. The most northern Manchur guard station is established at this place. The river Zeya bounds the mountainous districts of the Amúr, and here the floating wood is caught and built into rafts. The river now runs through broad plains grazed by cattle and cultivated in patches, with Manchur villages dotted along its banks, amongst which is Aigun, the harbour and yard of the Chinese Manchur fleet, comprising about thirty serviceable one-masted vessels. Hereabouts the oak and elm begin to be found, and the confluence of a large river, the Buruja, is next reached.

At Cape Svorbéef the rapid course of the Amúr begins. It cuts through a chain of high mountains, runs in some places at 5 knots an hour, and has a pretty uniform depth of 4 fathoms. Its width is not stated.

Two islands terminate the rapids; beyond them are plains, alternately richly wooded and dreary, and then archipelagos of islands to beyond the confluence of the large river Sungari, whose upper banks are very populous, and whose efflux makes the water of the Amúr far more turbid than before. When the Usuri river is passed,

the islands become exceedingly intricate, and there is a large sturgeon fishery. Beyond St. Cyril island, comes a broad reach, and next, diverging arms, and lastly, through a single and a narrowing channel, the Amúr joins the sea.—F. G.

The PRESIDENT.—We are so fortunate as again to have among us this evening a distinguished traveller in Siberia, Mr. T. W. Atkinson, and I hope he will give us his opinion on this memoir, the value of which is great; as all the positions have been fixed by astronomical observations made by officers of distinction in the Russian service.

Mr. ATKINSON, F.R.G.S.—Sir, I have visited the sources of the Amúr, and if you will permit me at some future time, I shall be glad to send a paper to the Society, in which I shall be able to explain and give a much better description of the country I have visited, than I could do at so short a notice.

Sixth Meeting, Monday, February 8th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*The Hon. W. Napier, Lieutenant A. H. Gilmore*, R.N., *and Mr. James Young were presented upon their election.*

ELECTIONS.—*Lieutenant J. A. Napier Hewett; the Rev. Anthony W. Thorold; Thomas Brown; Frederick D. Goldsmid; and George Seymour, Esqrs., were elected Fellows.*

The first Paper read was—

1. *Report of an Expedition to explore a Route by the rivers Waini, Barama, and Cuyuni, to the Goldfields of Caratal, and thence by Upata to the Orinoco.* By Sir W. H. HOLMES and Mr. W. H. CAMPBELL.

Communicated by the FOREIGN OFFICE.

SIR W. HOLMES and Mr. Campbell sailed from the river Demarara to the mouth of the Waini on August 27th, 1857, whence they made a boat excursion along the Mora Creek to the Barima River, in order to obtain the assistance of Indians for ascending the Waini. The Mora is a natural navigable canal, of 50 or 60 miles long, connecting the Barima and Waini: it might be turned to good account, for its banks are heavily timbered, but its channel is now choked with stumps and fallen trees. The schooner was taken up the Waini as far as the mouth of the Barama River, up which the party proceeded in canoes on September 6th, carrying provisions and articles of exchange. This river was rapid and remarkably tortuous, and the travellers could not reach the Dowaiama cataract and portage till the 12th. This river, the Waini, and the Barima, run through forests of immense timber; Sir R. Schomburgk never saw trees so

gigantic as those along the upper course of the Barima. On the 15th they came to an Indian path that led to the Cuyuni, at a distance of two or three days, through an undulating country, and followed it on foot, but owing to various delays they did not reach the Cuyuni till the 26th. They found this river to be about 500 yards wide, and containing a considerable body of water, though at a distance of 200 miles from the sea. They now started in a flotilla of "wood skins" which had been ordered to meet them. There were numerous rapids in the Cuyuni which caused great delay, but on October 1st they reached the mouth of the Curama River, which was blocked up by drift timber, otherwise it would have afforded the best line of route, as it passes only 30 miles from Caratal. It flows from the high savannah lands, and forms a natural outlet, that admits of being turned to account, for the produce of that immense and admirable grazing country. On September 30th the hills by the side of the Cuyuni became more mountainous, and more covered with blocks of quartz, and they gradually rose into the Ekreku range, about 2000 feet high. The scenery was striking, the atmosphere drier than elsewhere in Guayana, and the climate genial. On October 7th the Cuyuni was left, being still 300 yards wide, and the Yuruan was ascended: this tributary was about 200 yards wide. After 8 miles the mouth of the turbid Yuruari was reached: it was 150 yards in width, and was infested with a perfect plague of sand flies. The party ascended its stream: they reached the first savannah on October 9th, where the river ran, fringed with a narrow bush, through thousands of acres of pasture land totally unoccupied. Cattle farms began to appear as Tupuquen was approached; they had mostly belonged to the late Colonel Hamilton, who owned a vast tract of land in this neighbourhood.

The party were politely received by the Alcalde of the mud village of Tupuquen: it was formerly a missionary station, and is now chiefly tenanted by persons connected with the diggings of Caratal, from which place it is 6 miles distant. Caratal was reached by the party on October 14th.

The diggings consist of about 50 thatched lodges, for the most part without walls, and tenanted by from 120 to 200 diggers. There are no goldfield laws here, but each man can dig where he likes. The community appeared an honest one, but very sickly. In the process of gold-seeking, the bush has first to be removed, then the upper soil, then a hard subsoil which requires the pickaxe, and at 10 or 15 feet the "Graja" is reached. This is a layer of earth, clay, quartz, and iron stone, in which the gold is found. Below it is stiff clay. In most cases the miners fail in meeting with the

Graja: either they come upon solid rock or are flooded with water. The successes at the diggings appeared in no way commensurate to the hardships. Every man suffered from fever, and many from béche (inflammation of the lower bowel). Vermin of all kinds abounded. The usual diet was beef dried in the sun.

On October 18th the travellers started for Upata, which they reached on the 22nd, passing through Guacipata, and crossing a wide savannah with fine park-like clumps of trees, and dotted with hills, covered to their summits with verdure. The natives were as hospitable as their means admitted, but it was strange that in this pastoral country, milk and cheese were found to be rarely used, and butter was altogether unknown. Milk had the reputation of predisposing to fever. The ordinary food is dried meat and cassava bread. The whole country abounded with quartz (Sir W. Raleigh's "el madre del oro"). Las Tablas was reached on October 25th: it is the port of Upata, as regards the Orinoco; thence they boated to Barancas in 12 hours. This town was surrounded with lagoons that were then drying up: its inhabitants suffered much from fever, and from this time fever began to attack all the members of the expedition, though they had previously enjoyed perfect health. Dr. Blair, one of their number, died of it.

Thirty or forty Indians, of various tribes, had accompanied the party throughout their journeyings, and they are much praised for being honest, willing, and easily satisfied. The opinion of Sir W. Holmes and Mr. Campbell is, that the districts of the Waini, Barima, and their tributaries are worthy of a much closer investigation than either their time or experience enabled them to give.

Mr. Bratt started for Caratal very shortly after the above-mentioned travellers. In his tours of inspection he passed along three different routes to the diggings, and found in all of them the same repetitions of wet alluvial land, dry arenaceous savannah, stunted trees, coarse grass, large quantities of quartz lying about in all directions, and a remarkable absence of animal life. He estimates the number of men in constant work at 130, and the yield of gold at 100 oz. per week. He does not think that Caratal is, by nature, an unhealthy place.

Mr. James Shanks, surveyor, left George Town on October 3rd, and reports his belief that the climate of Caratal is fatal: he estimates the yield of gold at less than 80 oz. per week. If any trade should arise between Venezuela and Guayana, he believes the course it would take would be along the left bank of the Yuruari and alongside the Cuyuni; water navigation being, as a general rule, impracticable on these rivers. He considers that the colony of British

Guayana possesses natural advantages for pasturage and cultivation that are equal, if not greater than those of any ground in the far interior.—F. G.

The PRESIDENT: We return thanks to Sir William Holmes and Mr. Campbell for this very clear description of a country that they have traversed, and also to the Earl of Clarendon, our constant friend, for sending us this interesting communication from the Foreign Office. You will all recollect that the person to whom we are most indebted for a knowledge of the great territory adjacent to the country now explored is Sir Robert Schomburgk, a gold medallist of this Society, and formerly our Consul at St. Domingo. The subject is one that would have interested you infinitely more a few years ago; for the quantity of gold now found in the adjacent province of Venezuela would then have astounded most people, whilst it now passes for little. In fact, the description of the country accords with the accounts we have from all gold countries. The gold is found in the broken detritus of the country, at a few feet below the surface, as we know to be the case with a great number of the gold diggings of Australia and California. We are much obliged to these gentlemen for their interesting communication and their accurate account of the physical geography of the country. There was only one geological slip in the paper. The authors alluded to the country being of volcanic origin, and immediately afterwards spoke of a great deal of quartz. I beg leave to say that volcanoes and quartz rocks have no natural connexion.

MR. JOHN CRAWFURD, F.R.G.S.—I agree with you entirely in thinking the paper is very well written. Notwithstanding this, I have a few observations and a few strictures to make. The country is very like all countries situated in the eighth, ninth, and tenth degrees of latitude in possessing enormous forest trees. These gentlemen dwell upon the value of the timber, but it would have been as well to have told us what the quality of this timber is. They have not told us whether it is fit for shipbuilding, which is the only purpose for which it could be well exported. In the next place, they state that the country is well fitted for the growth of coffee. That is not the case. In a latitude of eight or nine degrees it requires an elevation of three or four thousand feet above the level of the sea to grow good coffee. This is the case, I believe, in Ceylon. No good coffee can be produced at the low elevation of a thousand feet.

DR. SHAW.—They report a mountain two thousand feet high.

MR. CRAWFURD.—That is the top of the hill; whereas to cultivate coffee we must go to the sides of the hill. I do not believe it to be an extremely fertile country. It is not volcanic, and you seldom find a country fertile that has not a considerable share of volcanic formation. Australia is a case in point. With respect to the gold, it is not at all to be regretted that the country does not belong to us, for its productive powers seem to be far inferior to both California and Australia. But, supposing the territory had been ours, it would have been impossible to introduce any kind of labour. What kind of labour could we get? I know there are gentlemen here partial to Australia as a penal settlement, who would say that Europeans might settle in this country. I am perfectly certain they never could. The Red Americans are totally unfit for labour. To employ negro labour, we must have slavery, and that we should never consent to; and, as for Chinese labour, it is very costly, and the people very offensive.

The second Paper read was—

2. *Journey from Little Namaqualand Eastward along the Orange River, the Northern Frontier of the Colony, &c. With Map.* By Mr. ROBERT MOFFAT, F.R.G.S.

Communicated by the COLONIAL OFFICE.

[This Paper will be printed in full in the Journal with Map.]

THE position of Gams, Mr. Moffat's starting-point, was obtained by a running triangulation from Mr. Maclear's northernmost beacons. For the rest, his latitudes were obtained from stars on either side of the zenith, and his bearings by a theodolite, but the state of his chronometer precluded any observations for longitude. His survey has fixed the lateral limits of the course of the Orange River, and determined certain speciäl points, such as the mouths of the Aintas and the Hartebeest Rivers.

The physical geography of the Orange River district is described in detail. Mr. Moffat considers that a substratum of metamorphic rock extends in a basin from about longitude 20° 30′ to longitude 25°; its lowest point being at longitude 22° 30′. That this rock was formerly covered by a thick sandstone deposit, now so largely denuded that little remains to attest its existence on the western side of the basin, except the Noup plateau, to which he ascribes a height of about 4000 feet. The hills adjacent to it are formed by protruded greenstone, and certain depressions in this basin are filled with deposits of later dates. Many geological particulars are also given of the country onwards towards Kuruman, and the features of the great cataract of the Orange River are minutely described. Mr. Moffat remarks, in such of the horizontal formations of South Africa as he has examined, that the volcanic rocks have simply had the effect of hardening those parts of the strata they have pierced. A result of this is, that all outliers of plateau ranges composed of these rocks possess a backbone or capping of basalt, which has enabled them to withstand those denuding forces which have removed the area formerly adjoining to them.—F. G.

The PRESIDENT begged to return the thanks of the Meeting to Mr. Moffat, and appealed to Dr. Livingstone to state what he knew of the region described by his brother-in-law.

DR. LIVINGSTONE, F.R.G.S.—The country is of a very arid, sterile character; but the paper is chiefly interesting from the fact of his having visited the Falls. They were visited about the year 1815 by the Rev. John Campbell; but he did not go so far down as to have a distinct view of the chasm into which the waters of the Orange River flow. But I think he states that he threw a large stone down into the chasm, and that it was a long time before it reached the bottom. This chasm seems to be of exactly the same nature as

the fissure into which the Zambesi flows, forming the remarkable Falls called by me the Falls of Victoria. When I was in the country to the east of that, adjacent to Kuruman, I saw evidences everywhere that this country was at some former period much better watered than it is now. Everywhere you see the remains of ancient river beds, in which you find shells, washed sand, and rolled boulders, showing that at some former period they had been large, never failing streams. On one occasion I followed the course of a very large river, flowing from the north to the south. All the feeders of that stream came in a slanting direction, and it could be easily seen that the river flowed from north to south, the same as the Zambesi does at a part of its course. At last I came to the confluence of that ancient river with a large lake near to where the Orange River now flows. At the confluence there were a few hills. These hills must have caused an eddy in the stream; and in that eddy a mound of tufa—soft white limestone—must have been deposited. I examined that mound, and to my delight found a great mass of the fossil bones of animals that had lived on dry land and had happened to be killed in the water; and in floating down and coming to the eddy had evidently been carried round and round, and then sunk. The tufa had been worn away a little, and the bones were standing out in relief. I allowed my waggon to go a long distance off, and took up a few of the bones and ran after it. It was only seven years afterwards that I was able to return, but I was prevented from taking out more of the bones; those I had secured I sent to my friend Professor Owen. They were brought safely to England, and then they were stolen from the railway between Devizes and London. I never had another opportunity of getting hold of those bones. If any future traveller happens to go that way, I beg him not to forget them. Now, that large lake was let out when the fissure was formed into which the Orange River now flows. You observe in the map that the lake spreads out before it comes to the fissure; in former times, instead of being spread out in that way, it extended over a diameter of at least 50 miles. The state of Africa was then very different from what it is now. Before the fissures were made which let out the rivers and lakes adjacent to them, the extent of water in the interior of Africa must have been enormous. A process of desiccation has gone on, and there are evidences of the gradual drying up of the country. I may mention one instance observed by myself. When the missionaries first went into the Kuruman, about 35 years ago, Mr. Moffat made a dam and a canal to irrigate a garden. Not a drop of water now flows down so far as where I have seen the remains of the dam and canal. In former times the Kuruman came all the way down to the Orange River; and there are persons now living who can remember when hippopotami existed in the Kuruman, where not a drop of water now flows, and where people have been drowned. This process of desiccation has been going on more rapidly in recent times than before. The elevation of the country is probably one great cause of desiccation, but the sudden destruction of trees in late years has, no doubt, had a very decided effect upon the climate. Thousands of acres of grass are burned up annually, and every tree, not in the greatest vigour, is burned down too. In Colesberg, during the time I was there, the river dried up entirely. We ourselves made a dam and canal in the hope of growing European vegetables through the irrigation thus afforded; but the river dried up, and by-and-bye we were obliged to dig in the bed of the river for drinking purposes. Water has not again flowed in the Colesberg. When Mr. Moffat visited that country thirty years ago, he found about a dozen streams flowing that now never flow. The drying up is apparently going on towards the north.

MR. W. J. HAMILTON, F.R.G.S.—Amongst the many persons who have given us information with respect to the physical geography of the interior of Africa, there is no one who has contributed so much as Dr. Livingstone himself. It is for this reason that I venture to ask one question respecting the physical struc-

ture of the country to which he has alluded. It is a point which to many persons in this room must be of great interest. I wish to ask, with regard to the occurrence of these fossil bones in the fissure which he describes as forming the outlet to the waters of the Orange River on the west, as the fissure through which the Zambesi flows has afforded an outlet to the waters on the east, whether the formation in which these bones occur may not have been one of the original rocks of the country, instead of being formed, as he states, by the eddy of the waters themselves? There seemed to me, from the manner in which he described these bones as occurring in the deposit, evidences rather of its being the original formation of the country, and that the bones had been washed out of this deposit and not washed into it by the eddy. It is a question of great importance in a geological point of view, whether they were washed in by the water at a recent period, or whether the deposit belonged to the original soil of the country, and had been merely laid bare by the action of the water flowing through this fissure? If Dr. Livingstone could give any information on the subject, it would, I think, be very interesting.

DR. LIVINGSTONE.—The bones were not found in the fissure. The fissure is altogether distinct from the part where the bones were found. The fissure was made at the side of the large lake, and it let out the water. There was a river which flowed from the northern part of the country, and about 100 miles to the north-east of the fissure, it fell into the lake. It was at the confluence of the river with the lake and not near the fissure that the mound was formed. It might be that the water of that ancient river had excavated the bones out of the country beyond. The general character is trap, which for hundreds of miles is perfectly flat; and over this trap we have a deposit of soft white tufa. We find this tufa deposited in considerable quantities in ancient fountains and wherever ancient streams have flowed. If the mound was formed of any other substance, say the detritus of the trap, then we might conclude that the bones had been excavated out of the banks of the river and deposited there. But the bones are found in the tufa deposited by the water, and as the tufa came from the water I imagine the bones came from the water after having floated down.

MR. W. J. HAMILTON.—I think from the explanation of Dr. Livingstone, it would appear that the bones are of a much more ancient formation than his first description of them would have led us to suppose. His first impression was that they were washed by the waters into the eddy, whereas by his present account it appears that they were pre-existing, and were merely washed out or exposed by the action of the water.

DR. LIVINGSTONE.—I imagine the tufa was deposited in the eddy of the waters, and these bones, floating down, were deposited in the tufa; then the weather wore away the tufa and exposed the bones. Some of the bones had fallen down to the bottom of the mound. But all would be cleared up if some geologists would go there and examine the mound.

The PRESIDENT.—I beg to say that I completely understand the nature of the question put by Mr. Hamilton, and of the answer of Dr. Livingstone. I have not conversed with my friend respecting the structure of the interior of Africa without being completely cognisant of what he meant. If I understand him aright, there was a period when a large region of the interior was occupied by waters that have now been let off. The animals which inhabited the banks of the broader and deeper waters at that period have perished, and their bones have been deposited in this tufa. That tufa being desiccated, bones have been found in it.

DR. LIVINGSTONE.—The bones are found in a mound.

The PRESIDENT.—Very well: the bones are found in a mound which has been formed out of these tufaceous deposits. I perfectly understand Dr. Livingstone, who has given a very fair and rational explanation of the whole

phenomenon. I am glad Mr. Hamilton asked the question, in order that we should completely understand the case.

The PRESIDENT, in calling attention to the next subject on the paper, "The Preparations for the Departure of the Livingstone Expedition," reminded the Society that this was probably the last occasion they would have of meeting the distinguished traveller in that room. He then read the following Letter agreed to by the Council of the Society: *

To the Earl of Shelburne, Under Secretary of State for Foreign Affairs.

15, Whitehall Place, 13th January, 1858.

MY LORD,—In reply to your letter of the 19th December last, in which, by the desire of Lord Clarendon, you ask the Council of the Royal Geographical Society to furnish his Lordship with any suggestions they may have to make in respect to the scientific portion of the labours of the expedition of Dr. Livingstone, I beg to offer the following statement.

At the last Meeting of the Council, held on Monday last, your Lordship's letter was read, and Dr. Livingstone was then called upon to explain his own views and wishes. Thereon he informed us as to the proposal which he had sent in to Lord Clarendon, after consultation with those men of science on whom he could best depend.

Having duly considered the subject, the Council passed the following Resolutions unanimously:—

1. The Council of the Royal Geographical Society having received from Dr. Livingstone an account of the proposal made by him to the Earl of Clarendon in reference to the expedition up the Zambesi river, beg to express their entire approbation of the project and of the persons recommended to be the scientific companions of the leader—these persons being Commander N. B. Bedingfeld, F.R.G.S., Dr. J. Kirk, F.R.G.S., as naturalist, Mr. R. Thornton as mining geologist, Mr. Thos. Baines, F.R.G.S., as artist, draughtsman, and storekeeper, and the Rev. C. Livingstone as general assistant.

2. The Council engage to furnish Dr. Livingstone with various suggestions concerning the observations to be made, and the best method of registering them.

3. That considering the well-known unhealthiness of the delta of the Zambesi below Tete, the Council earnestly recommend to Her Majesty's Government that Dr. Livingstone and his associates be forwarded (if practicable) from the mouth of the river to Tete in a *decked* steam vessel of light draught with as much celerity as possible, and that the steam-launch in preparation be employed solely for the navigation of the stream above Tete.

I have the honour to be,
My Lord,
Your Lordship's obedient servant,
(Signed) ROD. I. MURCHISON,
President Royal Geographical Society.

DR. LIVINGSTONE.—When I left the Makololo to go to Loando, I was in very much the same position that I find myself in now. I had been talking a great deal about the white man's country and about our ways to the Makololo, and a party of twenty-seven accompanied me to the west coast. When they came back, I said to my friends the Makololo, "Here are your own countrymen; let them speak; I intend to be silent now." I go out this time with several scientific gentlemen, and I hope, if it please God to spare us to return, to be

* *See* Proceedings, No. II., vol. ii., p. 82.—ED.

able to say when we come back, "I will be silent; let them speak." I expect that Captain Bedingfeld will be able to give a good account of the river system of the country. We are not at all certain as to that wonderful net-work of waters to the northward of the parts that I traversed. That will be one point which we shall endeavour to ascertain. I have the greatest confidence that Captain Bedingfeld will give us accurate information on this point, and also as to the navigability of the Zambesi itself. I came down that river when it was full. I have no authority for what it may be at low-water. I take the authority of two or three naval officers who ascended seventy miles when it was at its lowest—sixteen feet below what I saw it at—and their opinion was favourable as to its navigability, and I hope Captain Bedingfeld's judgment will also be favourable. Then, Dr. Kirk is an economic botanist; he is expected to give us a full account of the vegetable resources of the country. From Mr. Thornton, of the School of Mines, we expect to get a full account of the mineral resources of the country, especially in relation to the coal-field, specimens of which I brought home with me. Then, we are accompanied by an artist, Mr. Baines, and my brother will also attend to photography, so that we hope to give you all an opportunity of seeing exactly what the sun tells upon collodion. Dr. Kirk being also a medical man, will be able to determine the value of my opinion respecting the healthiness of the high lands over which I passed, and their suitableness as a residence for Europeans. I would like you all to remember that the Zambesi is about the dividing point between the fertile country northwards, and the comparatively arid country to the south. In the north, and especially to the west, cotton abounds in large quantities. Fortunately, to-day, in packing up, I stumbled upon a piece of cotton which I carried all the way from Angola. In speaking to a gentleman at Manchester, I mentioned that this cotton was very short in the staple, about half an inch in length; but I find upon inspection that it is double that length, and is a valuable cotton. That cotton grows in Angola, and I believe the country to the north of the Zambesi is to a large extent admirably adapted to the cultivation of cotton. And, no doubt, there are many other products in that fertile country. I would also say with our Scotch poet Burns:—

> "The best laid schemes o' mice, an' men,
> Gang aft-a-gley."

There may be some little hitch; we may meet with some misfortune, with something we do not expect. But we mean to do our best, and we are determined to do our duty. And I would most gratefully thank the Geographical Society and its officers, and you, Mr. President, in particular, for all the kindness and all the honours that have been heaped upon me. I thank you most heartily, and I hope that I and my companions may be the means of introducing a new state of things into that hitherto down trodden country.

The PRESIDENT finally informed the Meeting that it had been resolved to give Dr. Livingstone a farewell public dinner on his departure on the 13th inst., and concluded by expressing the hope that many of his friends and admirers would attend.

Seventh Meeting, Monday, February 22nd, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Mr. T. W. Hinchliff and Mr. George Seymour were presented upon their election.*

ELECTIONS.—*Lieut. C. C. Gordon*, R.E.; *Capt. G. Hancock*, R.N.; *Sir*

Samuel M. Peto, Bart.; Edward Beldam; N. Bridges; J. H. and W. J. Browne; A. C. Gregory (late Commander North Australian Expedition); Wm. Gaussen; John Kirk, M.D.; *and P. L. Simmonds, Esqrs. were elected Fellows.*

AUDITORS.—*Thomas H. Brooking and E. Osborne Smith, Esqrs., on the part of the Council, and Thomas Lee and W. Foster White, Esqrs., on the part of the Society, were appointed Auditors.*

EXHIBITIONS.—*A bust, by Mr. Wyon, and photographs of Dr. Livingstone, by Claudet and Clarkington; instruments, by Casella, for the Livingstone Expedition, presented by the Society; and a Chinese Map of the World, presented by Mr. Lockhart, were exhibited at the meeting.*

The first Paper read was—

1. *On the Arru Islands.* By ALFRED R. WALLACE, F.R.G.S.

DURING a six months' residence in these islands (January to June, 1857) my movements were very limited, owing to a visit of the Magindanao pirates, who devastated some of the northern islands and the eastern coast, and struck such terror into the natives, that they could scarcely be induced to leave their homes. I, however, succeeded in reaching the eastern side of the main island by one of the curious channels which traverse it, and which I was most anxious to examine myself, as from the accounts of the traders I could make out nothing of their real nature. This journey, with some other excursions into the interior, has enabled me to understand the accounts I have received of the remaining portion, and obtain a general idea of the geography of this interesting group. The position of Dobbo, the Bugis trading village, has been determined by Captain Stanley, and the northern and southern limits are pretty well known by the observations of the Dutch and French exploring vessels; my remarks will, therefore, be principally confined to the physical features of the islands, which are in many respects highly interesting.

The Arru group may be said to consist of one very large central island with a number of smaller ones scattered around it. The great island is called by the natives and traders "Tanna busar" (great or main land), to distinguish it as a whole from any of the detached islands. It is of an irregular, oblong form, about 80 miles from north to south, and 50 from east to west, in which direction it is traversed by three channels or rivers dividing it into four portions. The northernmost of these, the river Watelai, I passed through, and found the entrance about 25 miles S.S.E. from Dobbo, in the southern angle of an extensive bay. The entrance is about a quarter of a mile wide, with low undulating land on each

side. It gradually narrows to about the eighth of a mile, which width it retains, with very little variation, till on approaching its eastern mouth it again spreads out to about one-third of a mile. Its course is winding moderately, with a general direction of E.N.E., the extreme range of the bearings in passing through it being 105°. The banks (except near the eastern extremity, where there is much tidal swamp) are dry and moderately elevated. In many parts there are cliffs of hard rock, more or less worn away by the action of the water. A few smaller streams enter it right and left, at the mouths of which are some small rocky islands, and on the whole it has every feature of a true river. It is, in fact, difficult to believe you are in a small island, and not on a fine river watering some extensive country. But that the clear, cool water around you is briny as the ocean there is nothing to undeceive you. The depth of this stream is pretty regular, being from 10 to 15 fathoms. Its length is, according to the best estimate I could make, about 44 miles. The other two rivers, whose names are Vorkai and Maykor, are stated to be very similar in general character. Between these two, however, which are near together, the country is flat and swampy, and there are innumerable cross channels cutting the land up in every direction. On the south side of Maykor the banks are very rocky, and from thence to the extreme southern end of Arru, near the small island of Kri, is an uninterrupted extent of rather elevated and very rocky country, penetrated by numerous small streams in the high limestone cliffs, bordering which the larger portion of the edible birds' nests are obtained. The two southern rivers are universally declared to be longer than Watelai.

The whole country of Arru is very low, but by no means so flat and swampy as has been represented, or as it appears from the sea. By far the greater part of it is dry rocky ground more or less undulating, now rising in abrupt hillocks, now cut into steep and narrow ravines. Except the actual tidal swamps, which extend on one side or the other at the mouths of most of the small rivers which everywhere penetrate it, there is no level ground, although the greatest elevation is probably not more than 200 feet. The rock, which everywhere appears in the ravines and brooks, is a coralline limestone, in some places soft and friable, in others so hard and crystalline, as to resemble the mountain limestone of England. The small islands which surround the central mass are very numerous, several hundreds in number. On the west are very few, Wamma and Pulo Babi being the chief. On the north-west extremity of the main land of Wokan is Ongia, and a little beyond it, Wassia, the north-westernmost of the group. To the east of these, and all along

the east coast, are an immense number, extending to the extreme south, but nowhere reaching more than 15 or 20 miles from the central island. All are contained in a very shallow sea full of coral, and producing the pearl shells, which form the principal article of commerce in the islands. The whole of the islands are covered with a dense and very lofty forest.

The physical features here described are of the greatest interest, and probably altogether unique, for I have been unable to call to mind any other islands in the world which are completely divided by salt-water channels, having the dimensions and every other character of true rivers. What is the real nature of these, and how they have originated, are questions which have occupied much of my attention, and which I have at length succeeded in answering, to my own satisfaction at least. There are three distinct modes by which islands may have been formed, or have arrived at their present condition,—elevation, subsidence, and separation from a continent or larger island. Most volcanic islands have been elevated; coral islands with lagoons or with barrier reefs have suffered subsidence; while our own islands, Sicily, Ceylon, and many others, have no doubt been separated from the adjacent continents. Now, the Arru islands, being all coral rock, and the adjacent sea all shallow and full of coral, it would seem easy to account for their origin by supposing them to have been elevated gradually from beneath the water, as the much more lofty islands of Ké, sixty miles to the westward, have no doubt been. But in this case it is impossible to explain the formation of those regular river-like channels which cut across the largest and most elevated mass. A fissure produced during elevation will not explain it, for it has all the regular curves and windings of a river; and the action of tides and currents combining with the elevating force will, indeed, well explain the origin of separate islands divided by channels, of varying width and depth, but cannot be imagined to have produced a true river-bed 40 miles in length and of the greatest regularity both in width and depth. If we suppose the subsidence of a more extensive island to have brought Arru to its present form, we shall find it equally difficult to account for these rivers, because the subsidence of any country with an irregular and undulating surface must, by allowing the sea to overflow all the level tracts, produce a most irregular distribution of water in the channels separating islands, and form deep inlets, creeks, and inland lochs, all of which are here absent. The only other way of accounting for the origin of the Arru Islands is, by supposing them to have once formed a part of the main land of New Guinea, from which they have been separated

by the subsidence of an intervening district. The principal objection to this view is the great width of open sea (from 100 to 200 miles) between their eastern limits and the south-west coast of New Guinea. It is, however, to be observed, that this sea nowhere exceeds a depth of 40 fathoms, while immediately to the north, a fathomless sea reaches close up to the New Guinea coast, and also within 20 miles of Arru on the west. By supposing the central land of Arru to have remained unmoved during the subsidence, the present transverse channels may be explained as being in fact portions of actual rivers which flowed from the great central mountain-range of New Guinea, and here had their outlet after a course of two or three hundred miles. The position and direction of the Utanata and Wakua rivers in New Guinea, renders it not improbable that the Arru rivers may have been once the continuation of them. In no other manner does it seem to me possible to explain the origin of these channels; for I believe no example exists of anything but true rivers producing narrow, winding channels of regular width and depth *through an undulating rocky country*. If, therefore, there is only one cause in existing nature adequate to produce the effects visible, we must impute them to that cause, even though implying changes of sea and land of such an extensive character.

We have, however, other evidence of a totally distinct nature, which gives a powerful support to this view of the origin of the Arru Islands. The distribution of the animals of Arru and New Guinea proves the close connection between these countries, it being evident that, where a considerable number of animals which have no means of passing from the one to the other are common to two countries, some former communication must have existed between them. A few such cases of community may indeed be explained by the various accidents by which animals may be transported from one country to another; but when the community is more general, there is no such easy way of accounting for it. In the present case birds being almost the only animal productions of New Guinea of which anything is known, the argument must be drawn almost entirely from that class, which, it may be objected, can furnish no certain data, as they have the means of passing from one country to the other. It is, however, well known that birds have their geographical limits as accurately defined as other animals, and that many extensive groups are quite as unable to pass wide tracts of ocean as any quadrupeds can be.

The first fact, then, is, that out of the small number of land birds known from all parts of the coast of New Guinea, or about one hundred, I have myself found thirty-six in Arru. This renders it

highly probable that all the birds of Arru are also found in New Guinea; for, to illustrate by an analogous case, suppose about one hundred species of birds had been collected in various parts of Europe, and a person were then to collect for six months in England, it is not likely that more than thirty birds would be common to the two collections, although every English bird is also found on the continent. Some of these birds, however, are incapable of flight, as the cassowary, closely allied to the emeu of Australia; others are short-winged ground feeders, as the beautiful ground thrushes (*Pitta*), two species of which are identical with the only two known from New Guinea; others, again, as the "great bird of paradise" and the "king bird of paradise," are found only in New Guinea and Arru, and not in the islands of Ké and Goram, which actually approach considerably nearer to New Guinea than does any part of Arru. These facts, scanty as they must necessarily be in the present imperfect state of our knowledge of the zoology of New Guinea, certainly support the view I have taken of the former connection of the Arru Islands with that country.

A few remarks on the inhabitants and on the trade of Arru will now be given. The natives are all of the Papuan race, having typically a nearly black skin and woolly or frizzly hair. They are taller than the Malays, and more slenderly made; have a flatter forehead, more projecting brows, larger and thicker nose, with the apex rather bent down, and thick lips. The varieties, however, are so numerous and puzzling, that a person unacquainted with their origin would be apt to conclude that no line of demarcation could be drawn between the Papuan and Malay races. In Arru there are evident signs of the admixture of Malay, Arab, and European blood, and that so extensively and for so long a period, that the mixed races perhaps preponderate over the pure Papuans. Everywhere are found natives of Macassar, Javanese, Ceramese, and Amboynese, who have native wives, and have settled permanently in the country. In the Mohammedan districts a lighter skin, and finer features, indicate the infusion of Arab blood, while the discovery of many Portuguese words still in use in Arru, though unknown to the Malays, enables me to account for some decided South European characteristics which I had previously observed. That enterprising nation had evidently discovered these remote islands, and commenced the trade with them during the short period they held the supreme dominion of the Eastern seas.

The languages spoken in Arru are very numerous, but they possess so much in common that the different tribes can make themselves understood without much trouble. The affinities of the lan-

guages of this part of the Archipelago are very obscure, owing to the difficulty of distinguishing between the words introduced by the constant trading intercourse and intermixture, and those resemblances which arise from a community of origin. More materials must be collected to come to any definite conclusion on this point.

The character of the natives of Arru is very different from that of the Malay races. They are less reserved and apathetic, they speak louder, laugh more, and are altogether a much noisier, merrier set of people. The difference is, in fact, so very marked and striking, that it alone would suffice to separate them completely from the Malays. They wear no clothing, but a small waist-cloth for the men, and a piece of matting for the women. The bow is their national weapon, and they are very skilful in the use of it. They cultivate yams, sweet potatoes, and other roots, which with native sago form their whole food, the coast tribes adding fish, and those inland the flesh of the wild pig, kangaroo, cassowary, and various birds which they obtain occasionally with their bows and arrows. A rich layer of vegetable mould over the coral rock produces sugar-cane of the finest quality, which they chew incessantly and sell during the trading season at Dobbo.

In the villages of Wamma, Wokan, and Maykor, are resident schoolmasters, sent by the Dutch Government from Amboyna, and the inhabitants are Christians; one or two other villages are Mahommedan, but all the rest of the population are pagans. As far as I could judge, however, there is very little difference in their degree of civilisation, that seeming to depend more on their proximity to Dobbo, and the amount of communication they have with the traders. A Dutch war-schooner brings a commissioner annually to Arru, who stays about a month visiting all the principal villages to hear and decide disputes among the natives, and with the traders; so that the whole group is actually under the Dutch Government.

The trade of Arru is very considerable, and is all carried on with the port of Macassar and with the islands of Goram and Ceram. In the present year (1857) fourteen large prows, of from fifty to one hundred tons, and one brig arrived at Dobbo from Macassar. The owners are Bugis, Chinese, or Dutch, and the gross value of their cargoes about 20,000*l.* Besides these, not much short of two hundred boats and prows of small size arrived from Ké, Goram, and Ceram, the whole value of whose cargoes may be 7000*l.* or 8000*l.* more. The Macassar traders bring rice, tobacco, gambir, muskets, brass cannon, gunpowder, gongs, swords, knives, choppers, axes, English and Chinese crockery, calicoes and cottons, Bugis cloth and arrack. The prows from Goram and Ceram bring principally sago.

cakes, which are there manufactured for the supply of all the eastern part of the archipelago. The Ké islanders bring boats and prows for sale, wooden bowls, native earthen vessels, cocoa-nuts, and plantains. The produce obtained consists of pearl-shell, pearls, tripang, tortoiseshell, edible birds'-nests, and birds of paradise. Of these, the tripang, birds'-nests, and I believe most of the pearls and tortoiseshell find their way to China, the mother-of-pearl shell principally to Europe.

Each of the larger prows calls at Ké on its way to Arru, and purchases there one or two small vessels, which are loaded immediately on arriving, and sent with a supercargo to pick up produce among the islands on the east coast. The traders themselves reside at Dobbo, where they all have houses built entirely of poles and palm-thatch, and annually repaired. Natives from all the adjacent parts daily arrive, bringing their little bits of produce, which they sell to the highest bidder. They may often be seen wandering about with a single pearl-shell, calling at every house to see where they can get the highest price. These, as well as the tripang, tortoiseshell, and birds'-nests, are all bought by weight; and a whole cargo is made up by purchases of a few pounds or even a few ounces at a time. When a native has accumulated a little stock of produce, he takes payment in an assortment of articles, including always a box of arrack, the quantity of which consumed is immense. About 3000 boxes are brought annually, each containing fifteen square bottles of very near half a gallon each, making a total of about 20,000 gallons of strong spirit.

The prows begin to arrive at Dobbo in December, at the commencement of the west monsoon; and in June and July they return to Macassar. Some of the small traders remain the year round, picking up produce at a greater profit when there is less competition; and some of the larger merchants leave agents to do the same for them. Some years ago the profits of the Arru trade were very great; now they are very moderate, owing to the excessive competition. English calicoes can be bought in Arru as cheap as they can in England.

With the exception of the short visit of the commissioner, there is no law or government in Arru; yet the motley population, all striving to get what they can, live very peaceably together. Every one minds his own business, and, although he "does that which is right in his own eyes," takes care not to injure his neighbour. Gambling quarrels occasionally arise among the Bugis, and a few deaths by the creese may occur, as they do in Macassar; but on the whole, considering the mixture of races and religions, the competi-

tion in trade, and the crowding together of a population of about a thousand in such a remote spot and so far removed from the civilised world, a degree of good feeling and charity is shown which I am very much afraid would not exist in an equally miscellaneous assemblage of Europeans for similar purposes.

A few remarks on the climate will close this short notice of the Arru Islands. In most districts where the monsoon winds prevail, they regulate with more or less exactness the wet and dry seasons. In the south-western half of the archipelago, as far as Timor, Macassar, and N. W. Borneo, the east monsoon is accompanied by dry weather, the west by almost continual rains. In N. E. Borneo (Labuan), however, the seasons are reversed; the west monsoon, from about October or November to March or April, being accompanied by dry weather, and this same rule prevails more or less over all the islands of the Molucca Sea. In Arru I was led to expect the same kind of seasons, and was therefore much surprised on arriving there in January, which should have been the height of the dry weather, to experience during the whole month violent storms and almost daily rain. In February and the beginning of March it was finer, but still not a dry season, there being only periods of four or five fine hot days alternately with an equal quantity of wet, windy, and cloudy weather. The end of March and all the month of April were very fine. In April the winds began to be variable, and in May, when the east monsoon had regularly set in, the weather became wet and gusty, as in January, and this continued till we left in June. Both the natives and the traders assured me that the only regular dry season in Arru was a short one in October and November, during which months there is often no rain at all. This is just at the time of change from the east to the west monsoon, and from the dry to the wet season in the south-west parts of the Archipelago. This is only one of many anomalies in the climate of the various islands, an explanation of which cannot be given without more numerous and more accurate observations than have yet been made.

MR. J. CRAWFURD, F.R.G.S., said he had never visited the islands, but he had written about them. The name was a matter of curiosity: it had no relation whatever to our word "arrow" or dart, but signified in the Malayan language the tree *Casuarina muricata*. The native inhabitants were a peculiar people. Mr. Wallace concluded they were negroes, similar to the negroes of New Guinea; but he had seen them as more nearly resembling the inhabitants of the north of Australia. The population of the islands was very small, about 80,000, giving about eight to the square mile. A bank ran along between the islands and New Guinea. Tortoise-shell, mother-of-pearl, pearls in small quantities, edible birds'-nests, and birds of paradise, constituted the chief wealth of the islands. The birds'-nests were found in caves towards the

eastern side of the island; and the fishery of the tripang, the tortoise-shell, mother-of-pearl shells, and pearls on an extensive bank to the east. He had looked into the returns of what we received into this country of tortoise-shell and mother-of-pearl, and was surprised at the quantity consumed here: 33,550 lbs. of the former, value 33,153*l.*, and above 100 tons of the latter, value 34,630*l.*, had been imported into England. The islands were covered with stupendous forests; but then it ought not to be forgotten the most bulky trees will grow on the smallest amount of soil, where nothing like food for man can be produced—as, for example, the firs of Norway. The proof of fertility is the production of grasses in abundance and of good quality. The production of huge forest trees, be the trees ever so large, is not of the slightest consequence as indications of fertility. Travellers ought to be aware of this.

The second Paper read was:—

2. *Note on Sabrina Land, &c.* By CHARLES ENDERBY, Esq., F.R.G.S.

WITHOUT wishing to detract in the smallest degree from the merit due to Admiral d'Urville, Commodore Wilkes, or the officers and crews of the French and American Exploring Expeditions, for their discoveries in the Antarctic Ocean in the year 1840, I think it due to the memory of Captain Balleny that the discoveries he made in 1839 should be more determinately fixed on our charts than at present.

With this object I consider it my duty to bring under the immediate notice of the Council of the Royal Geographical Society the subject of South Polar Discoveries; and therefore beg, in the joint names of my brothers and self, to present the Journal of one of your gold medallists, Captain Biscoe, when in the command of the "Tula" and "Lively" from the year 1830 to 1833, on the occasion of his having discovered Enderby and Graham Lands. This Journal was kept in duplicate, and the other part has been deposited in the British Museum.

I also beg, in the joint names of Mr. G. F. Young, Mr. Thomas Sturge, Mr. Henry Buckle, my brothers, and self, to present to the Society the Journal and Log-book of the voyages of the "Eliza Scott" and "Sabrina," under the command of Captain Balleny, in the years 1838 and 1839, when he discovered the Balleny Islands and Sabrina Land; and it is to the last mentioned discovery, Sabrina Land, that I am desirous of drawing your special attention. This land, as will be seen on reference to the South Polar Chart published by the Admiralty, is stated to be doubtful; and in the Journal of the American Exploring Expedition it will be observed that this same

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* *See* the ninth Volume of the Society's Journal.—ED.

land was sighted and marked in the American charts as Tatton North's High Lands.

I submit for the consideration of the Council of the Society whether the discovery mentioned should not be more clearly marked on our charts, otherwise a question may at some future period arise as to the discoverer of the Southern Continent, since it has not yet been ascertained that Enderby Land is attached to that beforementioned, and in such case the Balleny Islands would not afford a claim of the nature of that set up.

In presenting these Journals to the Society, the gentlemen with whom I was associated in the equipment of the expedition fully concur with me in opinion that they should be deposited with your Society, where they will be in safe custody and properly appreciated, and where reference can be made to them if requisite.

I take this opportunity to state that I transmitted to the late Colonel Colquhoun, a member of your Council, an extract from the log-book of the ship "Brisk," belonging to the Southern Whale Fishery Company, which vessel I equipped, under the command of Captain Tapsell, from the Auckland Islands to the Antarctic Seas, in February 1850; and as I have neither seen nor heard that any notice has been taken of this voyage, I fear the paper has not come to hand.

Captain Tapsell was absent about six weeks, sighted the Balleny Islands, and proceeded thence to the westward to the long. 143° in a considerably higher latitude than that followed by Commodore Wilkes, without his having sighted land. As, however, I have not the Journal to refer to, I am unable to state if the weather was such as to enable him to see to any distance, but to the best of my recollection he was not impeded in his voyage by fogs.

If the Society should deem the subject of importance, I feel sure that on application to Mr. J. D. Powles, Chairman of the Southern Whale Fishery Company, by Mr. T. H. Brooking, a member of your Council, an inspection of the Journal would be readily permitted.

The above, together with the Journal of the "Eliza Scott," having been referred to Rear-Admiral Sir George Back, as one of the Vice-Presidents, Sir George says, that "having examined Mr. Balleny's Journal, I can come to no other conclusion than that he is entitled to the discovery of the islands which bear his name, including Sabrina Land, and that it would be an injustice to the memory and labours of that adventurous seaman to deprive him of the honour."—ED.

Eighth Meeting, Monday, March 8th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Lord Keane and Captain Sidney Webb, Mr. T. W. Atkinson and Mr. Nathaniel Bridges, were presented upon their election.*

ELECTIONS.—*Sir Culling E. Eardley, Bart.; the Rev. J. W. Hammond; the Rev. G. R. Lowden; Lord Radstock; Captain John Walker, Her Majesty's 61st Foot; Dr. G. Webster; and George Arbuthnot; Augustus F. and John W. Birch; W. Fowell Buxton; Hugh C. E. Childers; Charles H. Dickson (Her Majesty's Consul at Sukumkalé); William Lockhart (of China); William Longman; J. W. Towson; Alexander Trotter; Arthur Vardon; and Robert F. Williams, Esqrs., were elected Fellows.*

EXHIBITIONS.—A number of Inscriptions, copied by Mr. Cyril Graham, and a Japanese hat from the town of Hakodadi, presented by Lieutenant Gilmore, R.N., F.R.G.S., were exhibited at the Meeting.

ANNOUNCEMENTS.—The Chairman stated that he had received a letter that morning from Dr. Livingstone, from Birkenhead, who was in momentary expectation of starting, thanking all his kind friends who welcomed him at the dinner.

The first Paper read was:—

1. *Explorations in the Desert East of the Haurán, the ancient Land of Bashan.* By CYRIL C. GRAHAM, Esq., F.R.G.S., &c.

THE principal results of the journey described in these papers are:—

1. A visit to a very remarkable region, called es-Safáh, lying at above half a degree east of the northern portion of the mountains of the Haurán, and of which region hitherto only very imperfect accounts had been obtained by Burckhardt, Porter, and others, from information they had got from the Arabs of the desert, to whom alone this region was known. It resembles almost exactly the Lejah.* Like that wonderful region, it forms a complete island of basalt, and its interior is rent in the wildest manner; crevices so wide and deep that no one can venture across them. Indeed, it seems as if the whole had once been a mass of molten matter, and while in that state acted on simultaneously by some internal convulsive force and by some violent external force, and then suffered almost suddenly to cool.

* *See* Porter, 'Damascus,' vol. ii. p. 240.

Perhaps there are few instances of more curious volcanic regions than the Lejah and the Safáh.

2. The discovery of a vast tract in the Desert, called el-Hárrah, and covered with loose basaltic stones, extending for five days' journey eastward, while the mean breadth would be about two days' journey; forming, in short, a zone or belt in the fine rich plain which extends without intermission from the Haurán to the Euphrates.

3. The discovery of a chain of hills rising out of the region es-Safáh, and extending in a direction nearly north and south—a chain above 30 miles in length, and of which the southernmost peak had been the only portion hitherto known to us, and marked in our latest maps as a solitary hill.

4. The discovery of numerous cities or towns of the very highest antiquity situated on the eastern border of es-Safáh, and at different parts of the stony region el-Hárrah.

5. The still more interesting discovery of inscriptions in some unknown character engraved on the polished surfaces of the basaltic stones of el-Hárrah, and accompanied by figures of animals and other representations.

These were the chief results of the journey described in the first paper.

The second paper gives an account of:—

1. The whole eastern border of the Jebel ed-Drúz, which had not been explored; and among these mountains many ancient towns were found, similar to, though some of them more important than, the towns in the centre of the Haurán.

2. Of a vast number of cities and towns scattered over the Desert south and east of the Haurán, and of such high antiquity that they may probably claim to be the oldest towns now existing; and yet not mere sites, not heaps of ruins, but many of them still in as perfect a state as when the old people of this land dwelt in them—the streets perfect, the houses perfect, the rooms perfect, and the great stone doors still hanging, so that to-morrow a new race might take possession and "occupy" any one of these old places. The mansions are naturally to be had "unfurnished," but the fixtures are there, and the doors shut easily. The whole region east of the Haurán was unexplored ground. The Haurán itself was first visited by Seetzen in the beginning of the present century. He was followed by Burckhardt, who was anxious to explore the whole eastern side of the chain of mountains Jebel ed-Drúz, which forms the geographical limit of the Haurán. Burckhardt, however, in this was disappointed, owing to the unfriendly reception he met with from

the Druses of the mountains, under whose protection it was alone possible to venture on the border of the Desert. He merely crossed the mountains, and then returned and finished his journey in the centre of the Haurán. Since his time the Haurán has been visited by only a few travellers, the most recent and most enterprising being Mr. Porter, whose excellent book gives the most detailed account we have of the Land of Bashan. This gentleman much wished to visit the eastern side of the mountains, and to follow an ancient road which he saw from the castle of Salkhad (the ancient Salcah), and which he heard extends across the Desert to Basrah on the Tigris. His time, however, would not permit him to go east of Salkhad, but it was his strong conviction that important results would arise from a journey in the eastern desert. It was from Mr. Porter's accounts of what he had seen from Salkhad, and of what he had gathered from the natives, that Mr. Graham was induced to make the hazardous journey into the Desert, for the difficulties and privations of which he was so amply repaid by his discovery of these old towns and strange inscriptions.

It is the firm conviction of the author of these papers that we have, in the Haurán, the ancient Bashan itself, still remaining the cities which already existed when the Israelities conquered Og; and, ancient as these seem, he looks upon the more eastern of towns which he found far out in the Desert as dating from a still older period, and probably the work of the first Hamite emigrants from Shinar. The reasons for this belief are given in detail in the papers. Of the inscriptions nothing has yet been made. Whether they are of the same age as the buildings is difficult to say, but that they are of a very ancient form all philologists will probably agree. The fac-similes, together with a paper on the inscriptions, will be published in the Journal of the Royal Asiatic Society. If ever decyphered, we may hope that they will throw light on the history of this remarkable country, of whose early inhabitants we know nothing more than the short accounts we glean from the Pentateuch, but whose works are before us in these old towns, which stand as witnesses to all posterity of the truth of the early Scriptures.

The PRESIDENT.—I am glad that you have already returned your thanks so heartily to Mr. Cyril Graham for this very valuable communication, which has thrown so much light on the comparative geography of a region so interesting to all Christians. I have myself no knowledge of this region, but there are gentlemen present who have, I believe, approached near to it; and with reference to what has been written upon it, I need not remind you that several Englishmen have explored portions of the adjacent country. Mr. Churchill

lived many years amongst these Druses who occupy the northern part of Lebanon, and married a person of that country. Mr. Walpole traversed the country from Syria right across the Arabian Desert, but in a much more northerly direction. No European traveller that I am aware of has explored the region that Mr. Graham has now described to you. He has extended his inquiry farther to the south-east of Damascus than any former traveller. I need not say with what fidelity and truthfulness he has given you a picture of the cities described in the ancient writings. I may add, that independently of that absorbing topic—the reference to Holy Scripture—I feel exceedingly interested in the sketch he has given us both of the topography of the country and of that fine people the Druses. Lord Lindsay, who went down farther southward, to the edge of the region which Mr. Graham has examined, speaks of the Druses as a noble and gentlemanlike race. He writes of them as "noble gentlemen," and I really think that our excellent traveller has made us attached to these Druses. He has spoken of them as a fine people, as his protectors from the hostile Arabs, and as his best friends. I trust we shall hear more of them through the discussion, and I hope some gentlemen will put some pertinent questions to Mr. Graham with respect to them and the architecture prevailing in that region. I understand on the last occasion the attention of the Society was called to the physical and geological portions of the paper, and that it was supposed that some elevation of the country might have caused the desiccation and produced the desert condition of the present land. I understand from Mr. Graham that such is not his opinion. On the contrary, I learn that the country is still very fertile, and that it is solely owing to the mismanagement of the Turkish government, and to the continual inroads of the Arabs, that this region has become a desert.

MR. W. J. HAMILTON, F.R.G.S., with reference to a few remarks from Sir Henry Rawlinson, stated that he could not agree with Sir Henry Rawlinson that these great changes of elevation were continually going on, or that they came within the historic period. No doubt local changes had occasionally taken place, as in the case of Monte Nuovo and the Gulf of Baiæ, near Naples; but when great districts had been elevated so gradually as not to produce any convulsion sufficient to overturn buildings, the lapse of time during which this elevatory action was going on would generally be so great as to remove its date far beyond the historic period; and, according to Mr. Graham, the buildings here were in such a condition as to show that no sudden elevation had taken place. There were, no doubt, large districts in Asia Minor, where the elevation of the country had been so gradual that even the stratification of the tertiary formations had not been disturbed: therefore it certainly was within the range of possibility that elevation might have taken place in the district without causing any disturbance or injury to the buildings. But there was no evidence within the historic period that any great change of level had taken place in the district alluded to.

The paper itself was one of great interest, as the district eastward of the Trachonitis had hitherto been very little examined.

MR. CYRIL GRAHAM said, any active volcanic agency must have been long anterior to the building of the cities to all appearance.

DR. KINKEL, F.R.G.S.—With respect to the drawing of the head to which Mr. Graham has called our attention, it is decidedly of Greek or Roman origin. First of all, it seems not to be the head of a female; it is the head of a male deity, which I think is evident from the broad forehead, from the manly features, and more especially from the indication of beard under the nose. This beard is evidently there, for if we follow the line of the cheek we see it is distinctly formed; and if it were a female head it could not be there. Besides, the tracing of the hair shows that this is not an ancient Oriental figure. In the

treatment of the head in ancient Oriental work we find a certain regular outline of the hair; the hair is plain and straight. Now the lock to the left is entirely flowing, and flowing in so graceful a form, though a little exaggerated, that it can only belong to a very late period of time. I would say likewise that the eyebrows have the trace of the male form, and not the female, inasmuch as ancient art draws female eye-brows in the form of a semi-circle. Here, however, there is a straight connexion of two curves, which is more the character of the male head. I would also state that if this is the head of a divinity, and not a portrait, it is probably the head of Apollo, an identification of the Roman God of the Sun with the god worshipped in Palmyra. That it is supposed to be a woman may arise from the appearance of the filet, but there seems to me to be visible on the forehead nothing but a tuft of hair. This head evidently belongs to the period of the amalgamation between the East and the West. We have heard of Roman inscriptions found in Palmyra, and the connexion between Palmyra and the West is evident; and so it is very natural that Palmyra, which had a great deal of Roman civilization within its walls, may have been influenced by it in these matters. Therefore I do not think we can lay this head down as an old work. But the door evidently belongs to the period when the old cities were built.

DR. TRUMAN, F.R.G.S.—I should like to ask Mr. Graham whether he found any metallic fastenings to the door, as I see an indication of something like a bolt or a lock on it; and whether he found any specimens of a perfect arch in those cities?

MR. GRAHAM.—No doubt that mark is the place where an iron bolt once went. In every one of the houses I found the marks of such bars. The iron of course would have been taken away long ago by the Arabs, for those cities have been uninhabited for a considerable period. The hole underneath, which is always there, like our key-hole, was no doubt intended for a lock. There is no trace of any lock having been fastened on: probably it was some apparatus to enable the man from without to open his own door without ringing the bell.

DR. TRUMAN.—Did you find any specimens of an arch?

MR. GRAHAM.—I found many instances of perfect arches. That would be, I am told, an argument against the antiquity which I give to those cities. I did not find the arch in all of them; indeed I found the arch almost only within El Haurán; there I found the arch very frequently in houses which were decidedly built long anterior to the time of the Romans, because they frequently bore a Greek inscription which the owner of the house put over his door. In those houses we found such arches, but it has been suggested to me that they might have been introduced afterwards.

MR. E. HENEAGE, F.R.G.S.—Perhaps Mr. Graham will be kind enough to answer me a question or two with respect to the roofs of these houses. You have described numerous large cities in which there are houses that persons might almost take possession of in the present day. Are there any roofs, and if so in what style of architecture are they? Secondly, in the walls of the Cyclopean or any other period are there any gateways, and of what style are they? You have described one public building—was that the only public building you saw in all those cities, or have you reason to suppose that those cities were destitute of large public buildings, because that would be a most singular fact? Thirdly, with regard to the inscriptions on the stones, you have stated that one of them is something like that on a sarcophagus: now in going over these plains which were strewn with stones over a very large space, was there no appearance of graves or anything that would lead to the supposition that these stones might be the tomb-stones of a large public cemetery?

MR. GRAHAM.—First, with regard to the roofs of the houses: in those houses, like all Eastern houses, the roofs were flat. The construction of the

houses was simply this:—Imagine a square building composed of large blocks of hewn stone, and from the walls numerous blocks of stone, sometimes 18, 20, or 25 feet in length, stretch right across. In the space between these stones, smaller blocks are laid in very tight. In many instances I found these quite perfect; and no doubt the former inhabitants, like the Druses of the present day, when they took possession of a house, thatched over the roof with something and put gravel in between. Next, with regard to the walls of the city—I found many cities with walls. The walls were not very high, and they must have been used more as a place for the people to stand behind as a kind of protection, just as the Turks are fond of doing at the present day, than as walls of a city. But in many cities I found walls, especially in that great city Um el-Jemâl in the desert south of Bosra, higher than and as perfect as the walls of Jerusalem. I found gates sometimes, but not very frequently, in the walls. They were generally blocks of stone 8 or 10 feet high, and swing precisely in the same manner as I have shown you in this door, only there were two doors on the principle of folding doors. The next question was, I think, with regard to the inscriptions.

MR. HENEAGE.—Whether there were any remains of graves or inscriptions to lead you to suppose that it was a public cemetery outside the town?

MR. GRAHAM.—No; the stones where those curious inscriptions were found were loose stones lying in the desert. The whole desert for a space of about 5 days' journey—a camel journey—from west to east, and from 2½ to 3 days' journey from north to south, is covered with loose basaltic stones, polished, and on the surface of those stones in some places I found numbers of inscriptions, such as are now upon the table before me. They are, generally, figures of animals very rudely cut, which I am sure no gentleman will say is a high style of art. The inscriptions themselves cannot be deciphered. At the last meeting Sir H. Rawlinson stated that they were Phœnician inscriptions of the most ancient kind we have ever seen. It seems very presumptuous to disagree with so high an authority as Sir H. Rawlinson, but I do not believe them to be Phœnician. Thinking it might interest you who are here this evening, I have copied a portion of the inscription which was found on the sarcophagus of Esmanazar, King of Sidon. It has lately been deciphered; and although on such a short view you may not be able to pronounce any identity between that inscription and this, it will be interesting to see a portion of the longest inscription we have in the Phœnician language.

DR. WORTHINGTON, F.R.G.S.—May I be allowed to ask a question or two with respect to the head now before us? Surely it cannot be the impression upon any person's mind but that that head is of comparatively modern sculpture. In no respect is there any character about it of the ancient Astarte, Milton's Queen of Heaven. It may be a female head, but I confess I trace nothing of the character of Astarte upon it. I should be glad to know whether Mr. Graham traced among the Druses anything connected with the worship of the calf. That is an interesting question, into which Lord Ellesmere some time since inquired, and Mr. Poole of the British Museum recently deciphered some manuscripts to show that the Druses still worship the calf.

MR. GRAHAM.—With respect to the head, I do not wish to defend its antiquity. It may be very modern indeed, but it does not affect my cities. I found it merely in one of those ancient cities which no doubt was afterwards inhabited by the Romans. Next, to come to the Druses: I cannot say that I ever traced among them any worship of the calf, or, indeed, any other form of worship. All I know of their religion is solely what I have read in that remarkable work which was brought to France early in this century, and translated by M. de Sacy, a great Orientalist, and published in Paris in two volumes. There you find the only information about the religion of the Druses. They won't talk about the subject. The only thing I remarked is a

curious theory they have with regard to China. I may first say that the general feature of their religion is that they believe in one God essentially. They believe the Deity to be incarnate; they believe he has been incarnate several times. They believe that the first and noblest creature of the Deity is a principle they call Universal Intelligence, which has likewise been incarnate; but they never talk of this subject. They believe in the transmigration of souls. They believe that a good Druse will have a reward hereafter, and that the soul of a bad Druse will go into the body of a camel or a dog. But, with regard to rewards, they believe they will go into China. They believe that China is peopled with Druses. Whenever I met them they began to ask me about China very eagerly. I was afraid to inform them that we were at war with China, lest I might suffer from our fighting with the departed spirits of good Druses. They universally told me that they came originally from China, and they seemed to know that China is beyond India. Now the name of China is totally unknown to the Arabs of the desert, and the more peaceable inhabitants of Syria. It is only heard among the educated in great cities; however, Druses not only know its name, but they have a confused notion of where it is situated. They believe they came from China, and that after death they shall assemble again there as in Paradise. With regard to the worship of the calf, I can say nothing, because they never worship nor pray in public like the Mahomedans, and they are especially careful not to talk about religion. But since you ask me about this, I may mention one point in which I take great interest. There is at present a large opening for missionary labour among the Druses. They are bound to us English by particular ties, and at the present moment a missionary or a teacher would be received by them with open arms; he would not only not be molested, but would be treated with the greatest kindness, and schools might be organized which one day might be most valuable as a centre-point, in Haurán especially, for missions to the Moslems and to the people round about. From certain kindnesses and protection they received from Mr. Wood, our late Consul at Damascus, they are deeply indebted to the English, and now is the time for commencing such a work.

DR. PH. BARTH, F.R.G.S.—With regard to the inscriptions, Mr. Graham has called our attention to a Phœnician monument which has lately been found, and he said he thought there was some similarity between the letters of the inscription found by him and the inscriptions on the stones in these remarkable cities. It is very strange that many of those letters are entirely identical with the letters still in use with the Berber tribes of North Africa. The Berber tribes have an alphabet, and many of their letters are identical with the Phœnician letters. I find among these letters of Mr. Graham many forms which are entirely similar with the forms of the Berber alphabet. It only remains a question whether these signs represent the same letters as in the alphabet still in use among the North African tribes? With regard to the existence of Greek inscriptions, I would observe that their existence is alone not sufficient proof of their antiquity, because Greek inscriptions are found throughout the whole of Syria and Asia Minor. It is necessary to look at the shape of the letters to determine the antiquity of the inscriptions. Greek inscriptions were used down to the end of the fifth and sixth century. I do not know whether the inscriptions spoken of are of older date. Perhaps Mr. Graham will give us some information with regard to that point.

MR. GRAHAM.—First, I must state that Dr. Barth misunderstood me in saying that I supposed the inscriptions to be similar to the Phœnician. I said Sir Henry Rawlinson thought so. I do not think they are Phœnician. In comparing them with Phœnician, I can only identify for certain one letter; in both cases it is the round O—that is, supposing mine to be Semitic. But supposing it not to be Semitic, there is not then even that identity. The

form is so unlike the form of any other alphabet that I have yet seen, that I can say nothing on the subject. There are some letters which you might fancy were Greek, and some Aramaic, and some Chaldean. I got one whole inscription which at first I thought was Hebrew; but, on the other hand, some of them are so unlike anything Semitic, that I was forced at first to believe that we had two sets of language. On careful examination, however, I found 85 distinct symbols or marks. I do not say that they all represent different sounds, or rather that they have all different radical values; I think many of them are combined letters—that is, that they represent a combination of letters. I am very much interested in what Dr. Barth has stated with reference to the Berber alphabet. I have not yet had the opportunity of seeing it, but I hope he will do me the favour to show me the inscriptions to which he refers; and I have no doubt, if there are several letters similar in both, that we may be able to trace out something. At present there is no clue whatever to the inscriptions.

MR. CRAWFURD, F.R.G.S.—May I ask Mr. Graham whether this character seems to be written from right to left or from left to right? I have no doubt myself it is an original character. There is nothing very remarkable in supposing that such a character should be found, or that there should be several in the same country. I think in India there are eight or ten distinct alphabets, apparently separate inventions. In those parts of India with which I am best acquainted I counted eight or nine different alphabets. The one in question is extremely rude. But to have made an alphabet at all is a matter of great merit, and none but an ingenious race of men could have done it. No negro race has ever invented an alphabet, and no American race has ever done so. The Semitic race is evidently the most ingenious and energetic race of former ages. They bear a near resemblance in that respect to Europeans. I cannot help thinking that, if placed under more favourable auspices, they would have been a great and conquering people, which they never were, the Arabs excepted. With respect to the climate, my own belief is, that no change whatever has really taken place. The upheaving of the land, if there has been any, would produce no effect as far as the water is concerned. The rising of the land must have arisen from meteorological causes. I would ask Mr. Graham if he has found any remains of tanks or reservoirs for water, extending four or five miles in length, for the purpose of irrigating a vast extent of country? What he has stated with respect to the small reservoirs found in towns would answer only for drinking purposes; they would never be sufficient for the fertilisation of country to furnish food for a dense population such as El Haurán evidently must have contained. How was this population supported? We find in Scripture that sheep and oxen abounded. We know very well that sheep will exist without water for eighteen months at a time, but oxen must have water over and over again in the course of the day, even in a wet climate like our own. My notion is that there must have been extensive reservoirs. There were no rivers, no other means of supplying food for a dense population, except by extensive reservoirs, such as exist in several parts of India, especially in the Carnatic. Before I sit down I should like to ask also whether Mr. Graham saw any representations of the celebrated bulls of Bashan, so often spoken of?

MR. GRAHAM.—There are tanks, and what I should call very large tanks indeed, about the size of the one in the Green Park, Piccadilly; but there are none of the size Mr. Crawfurd speaks of, four or five miles in length. I never saw any of that size. But with regard to the water, I may mention a curious thing, that what I said with respect to these cities south and east of Haurán is applicable to Haurán in the present day. There are thirty-two or thirty-three towns inhabited by Druses; there is no water except what falls from the clouds, and there are only ten or twelve days' rain in the year.

Yet they collect this water very carefully, cover it over, and it lasts a long time. There are no trees in Haurán, except on the western side of the mountain, where there are springs; but in the plain of Haurán there are no trees and no water. I found no bulls engraved on the stones; but the country where I found the stones is to the east of Haurán a good way. In Haurán itself none of these inscriptions were found. It shows that the people who inhabited the country to the far east must have been a different race from the inhabitants of Bashan. It is only there I found the inscriptions. In the Haurán inscriptions are plentiful indeed; but there are none in these cities in the desert. These cities never seem to have been under Roman rule; they seem to have been deserted long before the cities in the Haurán were. They seem to have been cut off from the others; and, therefore, I can well account for there being no bulls put upon the stones. I found many curious things—a greyhound, a monkey, and an Arab on horseback running a man through; but all on the very lowest scale of art. The inscriptions, I think, are read from left to right, and from right to left.

The PRESIDENT.—I can only repeat my best thanks to Mr. Cyril Graham for this very remarkable communication. I coincide with him entirely as to the probable cause of the desiccation—at least of the want of water, by the destruction of large forests which formerly existed in that country. I have seen examples of it myself in Russia. The loss of water, the lowering of the great rivers in that country, the desiccation of the lakes, and the actual drying up of lands which were formerly wet and spongy, are entirely owing to the cutting down of vast forests which formerly existed, and which, attracting the clouds, caused the rain to fall. We have no need to refer this desiccation to any geological elevation of the country. That simple cause will alone account for the phenomenon.

Ninth Meeting, Monday, March 22nd, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Major W. H. Sitwell, Dr. Geo. Webster, Sir Culling Eardley, H. R. Grellet, William Lockhart, A. Trotter, A. Vardon, and R. F. Williams, Esqrs., were presented upon their election.*

ELECTIONS.—*The Rev. Thomas Marziot, Henry G. Bohn, L. P. Casella, Stephen Cave, Cyril C. Graham, Robert M'Kerrell, James Ewing Matheson, John Henning Nix, and Thomas George Staveley, Esqrs., were elected Fellows.*

The Papers read were—

1. *Contributions to the Knowledge of New Guinea.* By Dr. SALOMON MÜLLER.

Communicated by JOHN YEATS, Esq., F.R.G.S.

THIS was an account of those parts of New Guinea which are least known to Europeans, namely, the south and south-west coasts. It was accompanied by a large map containing the latest observations, soundings of the Princess Marianne Strait, and views of the land in the neighbourhood of Triton Bay, &c.

The physical condition of this region is very varied. From east longitude 132° 30′, or perhaps a little less, to about 135° 30′, there are high cliffs; only within the numerous bays are any levels to be seen, but near the last-named degree the rocks retire from the shore gradually southwards, and in this direction an extensive level border is visible, which stretches away in one vast wilderness to Torres Strait. In lat. 5½°, about, there rises a lofty mountain chain, which opens out north, and at 4½° presents an uncommonly bold aspect, some of the summits seeming to be raised above the limits even of perpetual snow; it runs apparently almost east and west, while the smaller chains hemming the coast follow the south-easterly and north-westerly bend of the island. The difference between the two chains is remarkable. That lying far inland has softly swelling outlines and a number of broad flat crowns, extensive plateaux probably, which, judging from their situation, must be surrounded partly by a temperate, partly by a cold climate. The more northerly coast elevations, on the contrary, are almost everywhere rude and craggy in form, not unfrequently resembling tall turrets and fractured battlements. The islands along the coast agree with it in external form and internal constitution; they are separated from it by straits or channels more or less broad, the banks of which are mostly steep as walls, and where damaged by the heavy gulf-stroke are commonly much perforated. Small sandy patches within the bays and coves are peopled by the half-nomadic Papuans. In the straits alluded to, the navigable water is pure and deep, ground being seldom reached at a depth of from 50 to 90 fathoms. Farther south, on the contrary, a ship of moderate dimensions cannot approach within a mile or even two of shore without constant use of the lead.

Some of the numerous river-mouths on the coast must be sought far inland, as in the southern portion of New Guinea the watershed is distant from the west coast. The Princess Marianne Strait is upwards of two geographical miles wide at its northerly entrance, but becomes gradually narrower inland. Its depth, reckoning from low-water level, is from 4 to upwards of 10 fathoms; at the southern outlet only it diminishes to scarcely 2 fathoms. The banks are low and marshy, and covered with wood. Fresh water may be found in a creek that empties itself not far to the south-west of the only little island there is in the strait. From this circumstance, and also from facilities for refitting here, the discovery of the strait is valuable, though it may never become generally useful.

The south-western promontory of New Guinea, as far as 135° 30′ E., is flat, consisting of bluish grey clay, interspersed with pieces

of quartz and limestone. From 135° 30′ to 138° 30′ are slips of white sand mixed with much quartz. According to Professor von Leonhard of Heidelberg, the mountains consist of a Jurassic limestone formation (oolitic series of English geologists), and their higher parts of a very characteristic dolomite of the same age. In the subjacent brownish grey dull-looking limestone fossil shells and vertebræ are found. The bed of the river Timbona yields a deposit not unlike certain strata of the tertiary formation called Tegel, which occurs at Vienna.

In the Princess Marianne Strait, where the banks are elevated beyond the ordinary level of the tide, pisolitic iron occurs (the German Bohnerz, together with Sumpferz or Rasen Eisenstein).

The west coast of New Guinea seems to be everywhere a wilderness, overrun with wood. Reports, botanical, zoological, and ornithological, of the whole district, accompanied, but were curtailed, that time might be devoted to consideration of the climate, the seasons, the tides, and currents, which were more minutely described. Mr. Yeats concluded with a few oral remarks on the inhabitants of New Guinea, their social condition, their usages, and the traffic they maintain with neighbouring people. The island was discovered, he observed, in 1526, but although so near to the Moluccas and to Northern Australia, still remained a comparative blank upon our maps. The Admiralty chart behind him had not the Marianne Strait marked upon it. He submitted that the shores of New Guinea were now known to be accessible, and the population by no means formidable. The Dutch derived from the country, through the Ceramese and others, pearls, gold, spices, medicinal barks, resins, and rare plumage; if our mercantile men were unmindful of these treasures, geographers, he believed, would not be indifferent to the glory of opening up to the whole world one of its largest islands, and to the poor fever-stricken residents of the Papuan coast a health-giving atmosphere among the mountains of the interior. There were fresh laurels for the first pioneers to this elevated region, alluded to by several scientific men, but explored as yet by none.—J. Y.

The PRESIDENT.—We beg to return thanks to Mr. Yeats for having been so kind as to bring before the public this translation of the memoir of Dr. Frederick Müller. It is quite clear that no geographer present can be acquainted with the vast variety of facts which have been brought before us in all branches of natural history, and I am not overstating the merit of the paper in saying that it is one of the most perfect geographical papers that I have ever heard. Whenever we get near the Indian Archipelago, we are apt to look to Mr. Crawfurd, because he has studied, not only the natural features of the adjoining regions, but also the character and language of the people. With regard to the geology spoken of, I beg to correct the translator in one or

two particulars. He spoke of the Jura chalk: it is what we call in English the oolitic series of limestone. All the southern coasts seem to be occupied by tertiary formations, which, like the tegel of Vienna, are probably younger than our London clay. What the interior may consist of, it will be, as the translator said, an object of great interest for British travellers to determine.

MR. CRAWFURD.—I do not take quite so sanguine a view of the advantages to be gained by a knowledge of New Guinea as Mr. Yeats does. It is the largest island in the world except Borneo, for we are not in the habit of considering Australia an island at all, but a great continent. At the same time, although Providence no doubt had wise objects in view in creating such an island, I believe it to be, as far as we know, the most useless large portion of the globe. From Mr. Yeats's own statement it is covered over with an immense jungle; it does not contain a single animal useful to man, except a few that have been imported, the hog and the dog. I shall mention a fact interesting to geologists, in comparing it with another island at a short distance. The island that I allude to is Bali; with an area of only about one-hundred-and-twentieth part of that of New Guinea, it contains a population of 900,000 inhabitants. I would venture to say that the entire country of New Guinea does not contain so many. The inhabitants of New Guinea are in an exceedingly rude state. With respect to its vegetable productions, I am not aware of any of value to commerce except one—the aromatic nutmeg, which it produces in considerable abundance. There are one or two other small articles consumed by the natives of the western part of the Archipelago as a cosmetic. New Guinea is the native country of the birds of paradise, of which there are five or six species. It also produces that magnificent bird the crown pigeon, and it is the only part of the world that does so. The western part of the island has for a long time been subject to a very small island, one of the Spice Islands, now under the protection of the Dutch. The people of the Spice Islands, through the means of a commerce in spices before the arrival of Europeans in India, attained a considerable degree of power and civilization, and they absolutely made a conquest of a very large portion of the western coast of the great island of New Guinea. The President has alluded to some acquaintance I have with the languages in that part of the world. I heard the word "Papua" for example mentioned: that ought to be pronounced "puwa-puwa." It means frizzly or woolly. When the natives of the Indian Archipelago talk of the land of New Guinea, they call it Tanah oráng-punea-punea; that means the land of the men with woolly heads. With respect to the inhabitants, I believe the country is peopled by the same race of negroes throughout. Being found universally so by the Portuguese, and thinking they bore a strong resemblance to the natives of Guinea, they called the land New Guinea. This people is to be found in our own colonies as slaves. I have seen them in Java and at Singapore as slaves. They are very robust, active men, very little short of the strength of negroes on the Guinea coast of Africa. They are by no means the same as the negroes found in other parts of the East. These last begin at the Andaman, a group of islands in lat. 15° and 16°, in the middle of the Bay of Bengal, where a race of small negroes is found not exceeding 4 feet 8 inches high. I have seen a few of them, but not in the Andamans; people take care not to land there, for the natives are a mischievous little set. Then, again, we have in the Malay peninsula a very small race; I will not say, however, the very same that is found in the Andaman Islands. In four of the great islands of the Philippine Archipelago we have them again in considerable numbers. But they are not to be found in the great islands of Java, Borneo, and Sumatra. They are, indeed, very capriciously distributed. We find them next in New Guinea and in all the little islands bordering its western side. From that point they extend continuously

until we come to the Feejee Islands in the South Seas, and then they cease. From the Feejee Islands to the coast of America not a negro to be seen. They are found in the island of New Caledonia, which has lately been taken possession of by the French. The New Hebrides and New Ireland are peopled by them; they are generally robust people, totally unlike the people of the Malay peninsula, the Andaman Islands, and the Philippines. Just one word for a name which has been frequently used by European travellers and referred to by Mr. Yeats. Alfores is not the name of a people at all: it is only the corruption of a Portuguese word meaning "outside people." It has nothing to do with any particular race of men. We constantly hear of the Alfores; it is equivalent to what the Spaniards call the *Indios bravos*—that is, the untamed, uncivilized Indians. With respect to the Negro languages, I dare say there are about 50 different ones. I have myself examined at least a dozen specimens, and no two of them agree. The only agreement among them is that they frequently borrow words from the Malay language.

MR. YEATS, F.R.G.S.—With regard to the last remark, I would venture to say that there are two names given to these same mountaineers: Alfores is the common generic term, but the word Marassi is also applied to them. Throughout this paper of Dr. Müller one thing has struck me: his statement is singularly clear, and, where argument is resorted to, it is peculiarly conclusive. He has decidedly stated that there are two distinct races, the mountaineers and the people on the coast. While the people on the coast wander about, a nomadic race, the mountaineers are a settled, energetic, hardy set of men, as we should expect them to be. I have lived in Holland between three and four years, long enough to become naturalised, and I have also lived between three and four years in the mountains at the base of the higher Alps. I know well the distinction between mountaineer and lowlander, and the contrasting qualities of the two races are so clearly brought out in this work of Müller, that I have no doubt in my own mind that there are two distinct races, and that the mountaineers will in the end prove the conquering race.

The second Paper read was—

2. *Latest Communications on Australian Exploration.* By Captain A. H. FREELING, R.E., Surveyor-General, Mr. STEPHEN HACK, and others.

Communicated by the Right Hon. HENRY LABOUCHERE, Colonial Office.

THE communications that have lately been received by the Society relative to South Australia refer to two adjacent regions, the one within the bend of Lake Torrens, and the other lying immediately to the westward of it. As regards the first of these, the results of Eyre's expedition and that of Frome were such as to hold out little or no hope that these regions would ever become available to settlers, yet small watering places have gradually been discovered and cattle stations pushed onward, until in 1856 they had extended up to Mount Serle, and even a short way beyond it, although all knowledge of the country ended at the Mount Hopeless of Mr. Eyre. In August of that year, 1856, a geological expedition was organised, under the joint leadership of Mr. Herschel Babbage and Mr. Bonner,

to explore the Mount Serle district for gold and for coal, and in the course of that exploration Mr. Babbage made a rapid reconnaissance to the northward. After considerable danger and difficulty, owing to the desertion of his native servant and the loss of his horses, he succeeded in reaching and discovering M'Donnell Creek and the large and apparently permanent waters of St. Mary's Pool and Blanche-water, lying on its lower course. Much excitement was caused at Adelaide by the news of this discovery, an account of which was published in the 'Register' newspaper, from which journal it will be sufficient to extract the following remarks, dated November 7, 1856:—

"At a distance of not more than six or eight miles from Eyre's track, over what was presumed to be a parched and thirsty country, Mr. Babbage has been fortunate enough to discover a fine sheet of permanent water, a mile long, surrounded by detached pools of permanent water. These result from a fine creek, having its sources full 60 miles higher up, and watering the country through which it passes. We invite renewed attention to this subject, not only because it is due to Mr. Babbage, but because it shows the impropriety of condemning vast tracts of country where no water was found by some traveller, who years ago struck a path across their solitudes. If large sheets of water, fed by a creek 60 miles long, existed in the immediate vicinity of Eyre's track without being discovered or suspected by that enterprising traveller, the same natural features may now exist in other places, though as yet unseen and unknown by white men. We sincerely hope that Mr. Babbage's discovery may prompt bushmen and others to make occasional excursions into those localities, which perhaps on insufficient evidence have been condemned as unproductive. Many districts are now covered with flocks which years ago were denounced as hopelessly sterile."

Nothing further appears to have been discovered in these regions until Mr. Goyder's expedition in the following year, 1857, an account of which was read before this Society last November, and which is already published in the Proceedings. It will be recollected that Mr. Goyder was the assistant-surveyor sent to triangulate the country north of Mount Serle, and that, after operations were commenced, he took the opportunity of making a general reconnaissance of the districts in which his duties lay. He descended M'Donnell Creek, and recorded his admiration of the abundance of the water in it, and also at Blanche-water. He followed the creek for 16 miles, and then leaving it travelled 6½ miles to the north-east, and came upon the margin of Lake Torrens. He found the water quite fresh, and an entire absence of marks of higher flood-lines,

and was led to believe that the water was little liable to changes of level. He records the vegetation visible on the northern shores of the lake, and also on several islands in it, whose perpendicular cliffs were clearly discerned by the aid of a telescope. He finally anticipated a time when Lake Torrens should become a depôt for future observers, and a properly constructed ferry-boat placed upon its waters. He, moreover, remarks that it would be perfectly useless to repeat the number of times that he was deceived by mirage and surprised by the enormous refraction peculiar to these plains; that some idea of it may be obtained from the fact that the large gum-trees seen from Weathered Hill to the north proved to be bushes of from two to four feet high, and that a large hill seen from the summit of Mount Serle by the aid of a powerful glass, and which he estimated at 3000 feet, dwindled down to 60.

Consequent upon this report of Mr. Goyder, Captain Freeling, the surveyor-general, set out on an expedition to investigate its truth; he took two boats, and thus states the result:—

"The extensive bays described in Mr. Goyder's report, the bluff headlands, the several islands between the north and south shores, the vegetation covering them, and their perpendicular cliffs, have all been the result of mirage, and do not in point of fact exist as represented. The conclusion drawn in that report, that the lake is subject only to the most trifling variation of level, is also proved to be an erroneous deduction."

Captain Freeling arrived at the lake on the 3rd of September. He observed a marked change in the country after leaving Mounts Distance, Gardiner, and Freeling; the ranges merged into hummocky hills, sometimes isolated and standing on an extensive alluvial plain, upon which drift timber was to be seen for miles, and which, by rapidly cracking into fissures under the sun's heat, gave sufficient evidence that floods took place, that a vast body of water was poured down by the M'Donnell and other streams running northerly after heavy falls of rain, and that the lake, when observed by Mr. Goyder, was merely an accumulation of such flood waters.

Captain Freeling reached the exact spot from which Mr. Goyder saw the lake. He was accompanied by one of Mr. Goyder's own companions, from whose statement it appeared that the water had already receded half a mile. For six miles back the land was nearly a dead level, and the soil was of the same character as that at the edge of the lake, and it had at times been flooded. The water of the lake was nearly fresh. On walking into it the party sank up to their ankles in mud. The flat-bottomed punt was brought and dragged half a mile across this mud, but there was not even then

enough water to float her. The islands in front certainly seemed to have perpendicular cliffs, but the land just left, and which was a dead level, had exactly the same appearance; the high and distant mountains of the Hopeless range were alone unaffected by the mirage.

The next day a determined endeavour was made by the party to wade through the water and mud, and to reach if possible the opposite shore. The walking was most fatiguing, and actually dangerous, for the mud yielded more deeply as the distance from shore became greater; six inches was the deepest water met with, and that only in patches. Two little islands were visited on the way; they were raised about one foot above the water, and were three miles from the starting point. Some of the party pushed on still farther, almost beyond the limits of their strength, for one of them was barely able to return. The whole party were fully satisfied of the utterly impracticable nature of the water for navigation.

"Neither is there any hope of a more fortunate result being obtained elsewhere; the whole character of the country bordering the lake, which is of the most desolate nature, and at present unfit even for stocking, being the same wherever it is reached.

"Mr. Eyre when visiting the eastern side of the west wing of the lake, Captain Sturt when reaching the same lake on its eastern side, and Captain Frome when reaching it on the western side of the east wing, all agree in their description of Lake Torrens; and their description would apply at this point, were it not for the freshness of the water. Where it differs from their description is here in the freshness of the water. This may be accounted for by the heavy floods in March, and the immense body of fresh water then poured down, still influencing the lake so as to freshen its water; but more probably the water visited by us is not the saltwater lake, although immediately contiguous to it, but the remains of the winter floods retained in a large, slightly hollowed basin, with a clayey bottom, but now rapidly evaporating under the sun's rays. Were this the case, the same extent of hopeless plains would reach from the neighbourhood of Blanche-water to the lake that has been found on the eastern and western plains."

No remarks are made in Captain Freeling's report on the appearance of Blanche-water and the adjacent pools, or on the permanency of their waters.

Mr. Goyder offered his services to explore the district in question more fully, and to ascertain the connection, if any, between the eastern and western wings of Lake Torrens, and to explore a route to the north-west between them; but, on his proposal being submitted to Captain Freeling, it was judged that no doubt existed but that

these two wings were connected, and that the general shape of the lake resembled a horseshoe, and therefore Mr. Goyder's offer was not accepted. This completes the information that has reached us about this region. Its triangulation was expected to have been completed by the end of the season as far as Weathered Hill.

As regards the districts to the west of Lake Torrens, larger tracts have been explored. In May, 1857, an expedition was sent out under Mr. Hack * to explore the north-western interior of the province, starting on a northerly course from Streaky Bay. The stores were conveyed by ship, and the horses landed at Port Lincoln, whence there is a line of numerous watering-places—one in about every ten miles—to Streaky Bay. Major Warburton was occupied at the same time in making an independent exploration. His routes are laid down upon the diagram, and are taken from the maps accompanying Mr. Hack's report, but no narrative of his expedition has yet been received by our Society. During their absence a third party, consisting of Messrs. Thompson, Campbell, and Swinden, made a rapid tour of about 200 miles to the westward of Lake Torrens, and starting from Saltia. Their route does not, however, admit of being laid down with any accuracy; but it is evident that the land they traversed was very far from being a desert, and that they discovered an isthmus of a quarter of a mile in breadth between the southern extremity of Lake Torrens and the head of Spencer's Gulf. †

To recur to Mr. Hack's exploration. After leaving Streaky Bay he encamped at Parla, on the top of a low range commanding an extensive view of the Gawler range, where the expedition is delayed by the illness of one of his most useful servants. He occupies the vacant time by starting with one pack-horse on a reconnaissance, steering for a gap in the range distinctly visible from Parla. On nearing it, he passed through twelve miles of dense scrub, then through a chain of salt lakes difficult to pass, and which was seen from Mount Centre extending to the north-west as far as the eye could reach, while to the north there was a mass of high ranges, one behind another, till they faded away in the distance. On the return journey to Parla, Major Warburton's fresh tracks were crossed; good, permanent limestone wells were found, and the country observed to consist of a considerable extent of fine grassy land running into bold bald downs, intersected with belts and patches of mallee scrub of various extent.

* South Australia, No. 156. Explorations by Mr. S. Hack. Ordered by the House of Assembly to be printed Oct. 13th, 1857.

† Sir George Grey, when Governor, traversed and made a plan of this isthmus, —ED.

He again started, but was again delayed by the continued illness of the same servant whom he was obliged to send back to the coast, and finally left Yarwandutta on the 21st of July. At Warroona there is permanent water in a creek; and in every direction, limited only by the scrub to the southward, the view from the hills extends over good grass and salt bush. The salt lakes still continued, but trended farther away from the range. About 25 miles to the north was a large range with a similar line of salt lakes under it. It seemed to be a feature of this country that the drainage of the hills was received by these salt lakes.

Round Toondulya there was grass country in all directions, and a fine permanent spring. Hearing from the black that there was only one more permanent water on this course, at Yarlbinda, he rode there, and found the features of the country to continue the same along the route, and ten miles onward to a detached hill to the north-west, but no other mountains were visible to the north or north-west, and the black guides asserted that there was no water for horses for a very long distance in that direction. Very far off is a country called Naralla, but on this course horses cannot be taken there. As viewed from the highest hill of Yarlbinda, the distant country appeared a level sea of scrub, without a hill or rise of any sort to indicate the existence of water in one place more than another. Mr. Hack felt that he might have gone as far into this scrub as the horses could have lasted without water, and then have returned to Yarlbinda; but such a course would have knocked the horses up, and crippled the future operations of the expedition; and he considered that the letter of his instructions should be departed from, and a practicable route sought out in another direction. The guide recommended that the party should go ten stages to the eastward, to a great salt lake, whence probably an opening would be found to the north. Reports were heard of several permanent waters and good country to the southward, but these were left for future examination, and Mr. Hack adopted the advice of his guide. Shortly after leaving Yarlbinda he passed through second-rate salt-bush country, and then through large alternate tracts of scrub, grass, and again scrub, to Murnea, whence he obtains a fair view of the Great Salt Lake, and again comes upon Major Warburton's tracks. To the north, from the highest hill near, nothing could be seen but a perfect horizon of salt; thence, until arriving at Yardea, the country is of variable goodness, and much of it is bad, but at Yardea itself it is excellent. In country of this description, that is to say, where sometimes there is excellent grass, and sometimes scrub, but with frequent watering-places, many of which

appeared permanent, and all of which are recorded in detail in the report, he travels along the line shown in the map. Freeling Range appeared to be in the middle of good grass country, and a very large spring is reported by the natives to be in its neighbourhood. Grass was found to be growing to the very edge of the Salt Lake. From near Pagan Creek, which promises well as a permanent watering-place, the range begins to break off, and to run out into low hills towards Baxter Range. The horses had become so footsore that it was now a difficult task to examine the country properly, and there was no permanent water found between these last-named places. Mr. Hack spent several days in exploring this part, as he was very anxious to get a good route for stock into the new country he had found; but at present a gap is left of some sixty-five to seventy miles without any known summer water.

He feels assured, from native accounts, of the existence of a very extensive tract of well-watered country to the north, in which herds of wild cattle are reported to exist, but thinks there may be considerable difficulty in finding a good road to it without the assistance of black guides.—F. G.

[The Government of South Australia have taken steps to pursue these discoveries by sending out an expedition, under the command of Mr. Babbage, to explore and survey the whole country between Lakes Gairdner and Torrens. The party is provisioned for eighteen months, and consists of Mr. Babbage as leader, Mr. Surveyor Harris as second in command, with 7 men, 3 drays, 1 tank-cart, 16 horses, and 180 sheep. They proceed by steamer to the head of Spencer's Gulf, and will commence their travelling as early as the season will permit them.]

The PRESIDENT.—We thank the authorities for this communication, and also Mr. Galton for the abstract. Some of the papers have been partially printed by the local Legislature of South Australia, of which this is a very well condensed and perspicuous abstract.

COLONEL GAWLER, F.R.G.S.—I have seen in the Adelaide newspapers summaries of the information Mr. Galton has been so good as to read to us. I have looked over them with very close attention, and have been so deeply impressed with their importance that I have had extracts from them struck off, not knowing the subject would be brought on here, with the intention of laying them on the table. First of all, with regard to Captain Freeling's elucidation or comment on Mr. Goyder's expedition, it seems to me that the good people of Adelaide are right in saying that if Captain Freeling had gone out just after the autumnal rains, when Mr. Goyder was there, and that if Mr. Goyder had gone, as Captain Freeling did, after three months' drought, that each would have seen the very reverse of what they now described. On the very plains of Adelaide, if a stranger were to come there just after the rains, he would have seen, as the early colonists did, a beautiful grassy country, and have been delighted to form a settlement there; but if he were to come after three months' summer heat, he would have said it is a bare brickfield, not worth the trouble of occupying. Such is the character of the land in South

Australia, and such, I take it, is the character of the land which Mr. Goyder and Captain Freeling saw near Lake Torrens. The water in the lake must be acted upon by the same circumstances. After the autumnal rains the fresh water would be abundant, as the fresh water in the Torrens river at Adelaide is abundant; and after three months' drought the lake will be almost dry, the same as the river at Adelaide is. This being the character of the country, I am sure that Captain Freeling's account does not sweep away Mr. Goyder's. The people in Adelaide say, and I think every one who has been in South Australia will say, that you must take the medium between the two. There is good land, but it must be occupied and turned to advantage. That brick-field-looking land at Adelaide, which is so burned up after a drought, is the finest corn country in the world. I doubt not there is profitable land near Lake Torrens, and that there exists some marvellous phenomenon which fills that lake with such an abundance of fresh water, coming down probably by Captain Sturt's enormous watercourse, thirty miles wide.

However, that is not the great point at issue: whether there is to the westward of Lake Torrens a way into the interior—that is the great point with which we have to do. I have always strongly had the impression that there is a way, and this is my great reason for thinking so: When, in Adelaide, the wind went round from the north to the east, the sky became lurid and dry and parched, and those hot winds came of which we have heard so much in Australia. When the wind began to go to the westward of north, it became cloudy and cool and moist. By careful inquiry, I found the same was experienced by the settlers in the Port Lincoln peninsula: they never knew of a hot wind from the north. The people of Adelaide never knew of a hot wind from the north-west; and Mr. Eyre, when he went into the region to the westward of the Port Lincoln peninsula, speaks of the N.E. wind coming from the north of Port Lincoln as never being anything but moist and cloudy (Vol. i. 343; ii. 140 and 143); whereas a little farther to the eastward the wind was always terrifically hot. This wind came from that desert to the east of Lake Torrens, in which Sturt's thermometer blew up—a desert on which, long before he went there, I had put a cross, and said, "A burning desert, the source of the hot winds at Sydney and at Adelaide." My conclusion having come out so clearly as regards the eastward, I fully expect that with respect to the westward will be equally borne out by the result, and that there will be found—as has recently begun to be found by Mr. Hack, Mr. Swindon, and others, a well-watered country to the westward of Lake Torrens and to the northward of the Port Lincoln peninsula. I think we have sober reason for expecting that that good and well-watered country will be found to be formed by a great drainage coming down from the north and west into Lake Torrens, fed by the evaporation of the Southern Ocean continually blown upon it, and by the tropical rains from the north. I was so anxious that Mr. Eyre should take that direction that I pressed him almost unreasonably to it; but his heart, rendered hopeless by Lake Torrens, was then set on the Swan River, and he took that ever-memorable tremendous journey—a journey which I believe will yet produce great results. I am delighted that the South Australians have taken up the matter in really good earnest. So convinced were they by the reports that came from Mr. Swindon and Mr. Thomson and others, that the run upon the Government Land Office for leases in that direction was so great that the Government got alarmed and stopped issues. They have now begun again, and there can be no doubt at all that there is a large quantity of good land in that direction.

There is another point upon which Mr. Hack speaks steadily, and that is that the natives assert that between Lake Gairdner and Lake Torrens there is a route into the great interior. That is a point likewise of immense importance to us. Any one who will look over Mr. Eyre's travels will perceive that

he came to the same conclusion. His opinion was that the natives came down originally from the north coast in three columns; the first by the west coast, the next by the east coast, and the third down the centre to the westward of Lake Torrens. He believes strongly the country was occupied in that way, and, therefore, that there must be a line of route through the interior.

Now, what a deeply-important political and geographical feature that is to search out! Politically, it brings the rich south-eastern provinces into communication with North Australia, and with the magnificent islands of the Indian Archipelago. By such a route it would be possible to establish electric communication with England, if we chose to lay the line. I do not know whether the Society is aware that an expedition has been formed under Mr. Babbage, and that he has probably already set out for the interior, well prepared with provisions for eighteen months, and with apparatus for distilling water. I consider this expedition of immense importance to all who are interested in the geography of Australia, and that we may at least begin to think about getting up a line of railway from Stokes's Victoria River to the south-western point of Lake Torrens.

The PRESIDENT.—We are much obliged to Colonel Gawler. It is seldom we have persons present so much experienced in Australian geography; and if his view should be borne out, I shall be happy to modify the views which I have ventured to broach theoretically respecting the great interior of that country. I beg to submit to Colonel Gawler that the experience of Mr. Gregory on the north certainly led us to expect that the country towards the interior became so saline that it would be worthless, and useless to try to penetrate it; whilst all our experience upon the west has tended in that direction. Up the Shark river, and to the river that bears my name, the country is so saline that nobody can settle upon it. I am afraid my friend Mr. Arrowsmith's name is not in a better position than my own. His river passes altogether through saline marshes.

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1858.

Tenth Meeting, Monday, April 12th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS. — *The Rev. J. W. Hammond, and T. Fowell Buxton, L. P. Casella, and Robert M'Kerrell, Esqrs., were presented upon their election.*

ELECTIONS.—*Dr. Adolphus Bernays; Sir Robert Peel, Bart.,* M.P.; *Dr. John Shea,* R.N.; *Viscount Strangford; the Right Hon. John Wynne,* M.P.; *and John Francis Champion; Charles Hutton Gregory,* C.E.; *Morrell Dorrington Longden; and George William Wheatley, Esqrs.; were elected Fellows.*

The Paper read was:—

On the supposed Discovery of the North Coast of Greenland and an Open Polar Sea; the great "Humboldt Glacier," and other matters relating to the formation of Ice in Greenland, as described in 'Arctic Explorations in the Years 1853–4–5, by ELISHA KENT KANE, U.S.N. *Philadelphia, 1856.'* By DR. HENRY RINK, M.D., of Copenhagen.

IT will be recollected that Dr. Kane attempted to take his ship farther to the northward on the track discovered by Captain Inglefield the preceding year; that he did so, to a short distance; that he was frozen in and lost his ship, and finally saved himself and party by returning in sledges to Uppernavik. During his two years' stay in Smith Sound, he made various sledge excursions; and his discoveries, when engaged in these, must be regarded as the chief profit of the expedition. These discoveries are, 1st, The great Humboldt Glacier, which he describes in most eloquent terms, as the glacial outpouring of that vast ice-field, little less in extent than the whole of Australia, which forms the interior of Greenland; and, 2ndly, The north coast of Greenland and the Polar Sea, which washes its shores, and which is kept open by the Gulf Stream. As to the first point, Dr. Rink denies the existence of any evidence by which we can speculate on the nature of the interior of Greenland; it may consist of mountain chains, which protrude through the ice,

for aught that is known about it. He considers that Humboldt Glacier is but one of the many glaciers which run down into every fiord along the coast, none of which Dr. Kane had had an opportunity of examining, but in the investigation of which Dr. Rink has been actively employed for eight years. He does not even find cause to believe that Humboldt Glacier discharges any large part of the whole amount of ice which moves down from Greenland to the sea, but that the direction of greatest discharge is elsewhere (Jakob Haven, &c.); at all events, data are entirely wanting for estimating either the absolute or the relative amount of discharge of ice from Humboldt Glacier. Dr. Kane describes the formation of icebergs under an hypothesis, apparently offered as his own, of the glaciers moving down along the sea bottom, and from time to time breaking up and floating to the surface. Dr. Rink expresses surprise at Kane's ignorance of his own similar hypothesis, which has been published in many forms, and ought naturally to be familiar to Arctic explorers. As regards the second discovery, that of the northern coast of Greenland and the open Polar Sea, it appears that the entire story rests upon the assertions of Morton the steward, and of Hans, the Greenlander. These two men made a sledge expedition to a distance of three days' journey from camp, but a critical examination into their proceedings during those days leads Dr. Rink to throw great doubt on the value of their observations, as related and mapped out by Dr. Kane. If we are to credit their accuracy, we must be prepared to believe that they laid down more than 20 points of longitude and latitude during their toilsome journey, besides fixing numerous positions on the opposite coast, which Morton maps out in a detailed manner, although he never approached nearer to it than from 25 to 40 miles. Their itinerary is as follows: the first day's journey takes them beyond the face of Humboldt Glacier to open water, flowing with a strong current; the next day's journey is only 6 miles; on the third day they have a very rugged way to travel over, and are detained by hunting, killing, and cooking a bear. A high promontory is before them, which they have not strength to reach; and ultimately they stop at the foot of a "knob," stated by Morton to be 500 feet high, but upon what grounds it does not appear. He ascends this knob, and from its top professes to obtain a view for 36 miles, over a sea entirely free from ice; but we are left entirely in the dark as to the extent of the field of view which is left clear by the promontory. Morton sees a mountain to the northward, which he lays down at the enormous distance of 100 miles from the point where he stood, and yet he remarks on the barrenness of its top and on the streaks

and ledges upon its face. He sees crowds of waterfowl, and Hans observes some plants, but brings back no specimens, although they are named in scientific phraseology in Kane's work. Dr. Rink joins issue on nearly every one of the data and theories based upon Morton's journey. He considers it out of the question that a man, looking out from an elevation of 500 feet, could determine the absence of floating ice at a distance of 36 miles. He also throws great doubt upon the probability of Morton's point of view being as high as he states it to be, for he believes that he identifies it with a hill whose measurement is very variously reckoned by Kane at pages 299, 305, and 307. He argues that the absence of drift ice tends to prove that the sea was permanently frozen to the northward, whence the wind was blowing strongly, and that the vast number of birds go to prove the smallness and not the greatness of the water at which they congregated; and, finally, that there is nothing remarkable in the discovery of a sheet of open water, in midsummer, only 90 miles to northward of where a ship was sailing the preceding year. The picture in Dr. Kane's work of the open sea, with Morton in the foreground, will not (says Dr. Rink) bear criticism. The sun is represented as half bathed in the water, although, at that season of the year and latitude, it must be far above the horizon.

The PRESIDENT.—In returning thanks to Dr. Rink for this communication, I may remind you that the author is a distinguished Dane, who has spent nine years of his life in studying the natural phenomena of the great continent of Greenland. You have all doubtless admired, as much as I have, the work of that great American explorer, Dr. Kane; and I am sure there is not one present who would not be as sorry as myself to derogate in any degree from his real merit, and from that glory which he really attained for himself by his most adventurous voyage. This is simply a critical essay respecting two points of Kane's voyage, the first touching the formation and movement of glaciers, the other as respects the proceedings of Morton, the steward of Kane's ship; and as I see here present two eminent Polar voyagers, I know they are the persons best qualified to speak on this occasion. In the mean time Mr. Arrowsmith has defined on the map the position which he and others who have gone into the question assume to be the ultimate point which may be relied upon, as having been reached by any one of the persons who served under Dr. Kane.

REAR-ADMIRAL SIR GEORGE BACK, VICE-PRESIDENT.—I think it is the fate of nearly all voyagers and travellers to undergo the ordeal of criticism from other travellers; and, however interesting their accounts may be in other respects, yet, if their observations are not correct, I need not say that they deteriorate in a geographical point of view from the value of their narratives. In making this observation, it will not be supposed for one moment that I cast the most distant reflection upon the memory of that gallant American, Dr. Kane. Nobody could have done better than he did. Few, if any, have undergone greater trials. I would observe that there is not the slightest idea of any concealment in his book. He states clearly the observations which he got from Morton, especially the meridional observations, which are

always most desirable, and which formed one of the bases upon which he founded his map. He added to that, another mode of calculation called the dead-reckoning; but unhappily, it was an incorrect dead-reckoning, and there was the error. Now if he had done what I am certain Professor Bache or Lieut. Maury would have done—taken the observation of the latitude of the day, and added the difference of latitude of the distance travelled from that point correctly—that difference, added to the latitude, would give the precise point which should be put down for the extreme to which Morton went. That would be the correct latitude. Now, although it may appear to many of us, and particularly to those who are not practical geographers, that a few miles more or less can make no difference in a great and perilous undertaking of this kind—accomplished as it was in such a persevering and gallant manner—yet there is one little national point of view in which it is of some importance. By making this deduction it would then appear that the British flag was unfurled farther north than any other. But, if the correction be omitted, and the error be allowed to remain, then the American flag has an unquestionable claim to the honour. That, I believe, is the chief point. As regards the glaciers, I shall not enter into their theory, because it would occupy too much of our time, and Dr. Rink, who is really an authority upon the subject, has passed eight or nine years of his life in investigating the laws of glaciers. He tells you that, at the elevation of 2000 feet—the level of continual snow—they rise in plateaus one above the other; twenty-three of which plateaus he counted. That the ice is forced gradually down in one vast mass, following the sinuosities of the valleys to the fiords, and, having a thickness of at least 1000 feet, still glides along the uneven bottom until it is acted upon by the water, and, struggling to rise, is at last liberated by the action of the swell, when vast masses are broken off and detached. Those masses form icebergs, and they are known in many instances to attain a height of from 150 to 200 feet, and even more; sometimes, indeed, they are fully a mile in length. I think there can be no doubt of that, as Dr. Rink has seen them with his own eyes. A little incident fell under my own observation at Spitzbergen. With my friend Sir John Franklin, and in a boat commanded by the late Admiral Beechey, we were going past a glacier at the distance of perhaps half a mile with a party of men prepared for a survey; a flight of eider ducks passed by, and one of the officers thoughtlessly fired his gun; the concussion of this acted on the iceberg and brought down a huge mass. We looked with some interest at it, but without any alarm, for there was a low point of land between us and the iceberg. The mass was submerged for a short time, but soon rose again, and then sent a wave to the opposite shore, perhaps a mile and a half distant. The return of that wave struck the launch in which we were, lifted her up, and threw her high and dry on the beach and upset us. I merely state this to show that there are other reasons besides those mentioned by Dr. Rink, for the appearance of small icebergs, though doubtless he must have seen many similar effects. The learned Doctor says that the ice calved—that it rises from below, which in fact, it generally does, but in this instance such was not the case. Again, Dr. Rink speaks about the open sea in the vicinity of ice: now that is a very delicate question to enter into, and on this occasion I am not prepared to do so; but I can speak of some of the stream-holes, or open spaces of water, which do occasionally form in the ice. I may mention an almost ludicrous circumstance that occurred when I commanded H.M.S. *Terror*. Surrounded by ice in the frozen straits off Southampton Island, with not a particle of water to be seen, and the ship in some danger, in the course of an hour a pool of water opened out, perhaps some 30 feet in diameter. Within an hour or an hour and a half afterwards, that pool was more or less covered with birds of the gull species, and even large narwals came up to breathe there. I may mention that it was Sunday afternoon when a sturdy British sailor betook himself to

the side of this open water, and as he said formed a quarter-deck there, and began to think of his wife and children. While he was thus lost in contemplation, a huge walrus rose up within a few feet of him, and so frightened the boatswain, who had never seen one before, that he ran on board and swore he had seen the devil. I only state this as one of many instances to show that wherever there is an open stream-hole, animals and birds invariably flock to it. As to the land which is said to have been seen, I may simply state what you have already heard—that Morton, who was the steward of the ship, seems to have been singularly qualified above all stewards that I ever heard of; inasmuch as he knew how to make observations and other nice calculations, seldom found except in men of superior attainments. Be that as it may, I give him full credit for his knowledge. He says he ascended a hill 500 feet high. Now it is not very difficult to calculate at what distance the land might be seen from that height; but as my friend Captain Collinson has something to tell you on this subject, I leave the explanation to him.

CAPTAIN R. COLLINSON, R.N., F.R.G.S.—I think it very fortunate with yourself, Mr. President, that on this occasion we are acting the part of mediators, and not accusers, and that it has fallen to a Dane, and not to an Englishman, to write this criticism. But I feel assured that we all ever shall acknowledge the debt of gratitude which we owe to the noble individual who made this voyage. It appears to me that we have nearly exhausted all that can be said upon the subject. There are certainly one or two points which require attention. One point which I would advert to is that the existence of the Humboldt Glacier gives a colour to the theory of an open sea, because we never could have a *mer de glace* without great change of temperature. If it were perfectly cold there during the whole season the snow would remain snow as it drifted, but there must be a change of temperature to turn it into ice. I think that is one reason why we may place faith in Morton's account of there being open water. Still I will say this, that as far as my experience goes, it is almost impossible that it could be open water throughout the whole of the year, because I am sure it would have affected the temperature which Dr. Kane experienced at his winter quarters; so that I look upon it as a temporary opening, or water-hole. And I must add that I think Morton is mistaken in his statement with regard to the current. I cannot conceive it possible that a tide should run to and fro at the rate of four knots an hour, the liquid being from 7 to 11 degrees above freezing point, without sweeping the ice out of Peabody Bay and rendering Smith Sound entirely free up to Kennedy Channel. This must only be looked upon as a remark on my part, that possibly Morton may be in error with regard to the current. But there is one other point also I think it right to allude to, for the sake of meteorologists, in which I believe Dr. Kane is mistaken. In his series of observations for temperature he has taken the mean of his thermometers. Now the thermometers supplied to the former expedition were essentially bad. I had not one that registered the freezing point of mercury within 12 degrees. Dr. Kane has taken the mean of these thermometers. In the course of all our observations we corrected each thermometer by the freezing point of mercury, so that in the case of Dr. Kane's temperatures being compared with ours, there is the necessity of a correction. I will now refer to the *vexata quæstio:* that is—the extent to which Morton really got. Dr. Kane tells us that these positions are the mean of the uncorrected dead reckonings. As geographers, we cannot accept that; we must stick to observations. What the sun tells us, is more convincing than what we suppose we have gained. By way of elucidating how extremely Morton's reckoning got the better of his judgment, I would just remark that at Cape Maddison he left his sledge and set off for Cape Jefferson. From Cape Maddison to Cape Jefferson is 34½ miles, as the crow flies. From Cape Jefferson to Cape Con-

stitution, his farthest point, is another 27 miles: that makes 61½ miles which he travelled in a straight line; double that (for he came back), and that makes 123 miles; and I think the least we can give him for sinuosities is one-third more, which will make 167 miles. That is to say, he travelled 167 miles in 36 hours; so I believe we are quite justified in having recourse to his observations, and rejecting his reckonings altogether. I believe we shall have to bring Cape Constitution, as far as I can understand, 35 to 45 miles farther south, and the effect of bringing that cape down, will also have the effect of narrowing this channel. I cannot conclude without paying what I think to be a just tribute to the man who commanded on this occasion, and expressing my opinion, how fortunate it is that such a man was there to command, one who could not only persevere in the way he did, but who set himself studiously to work to collect every observation that would bear upon geographical discovery. However we may analyse his theories, or dispute his conclusions, or doubt his geographical positions, yet, as the British nation, we shall never cease to respect with admiration and esteem that noble spirit who went forth at the peril of his life without the tie of kindred or nation to succour our fellow countrymen.

DR. A. ARMSTRONG, R.N., F.R.G.S.—I fully agree with the observations which have been made by Captain Collinson. I beg, however, very briefly to direct the attention of the Society to a circumstance which has not been alluded to in the course of this discussion. It appears to me that nothing new has been advanced by Dr. Kane with regard to the existence of water where he is supposed to have seen it. If we refer as far back as 1827 to Parry's memorable attempt to reach the North Pole, we find that he met with water as high as 82°. It is not improbable that water may have been seen by Dr. Kane's party, but not to an extent that would establish the existence of a Polar sea. If you look to the chart, you will find that the outlet between the eastern coast of Greenland and the western coast of Norway affords greater facilities for the escape of ice than any other part of the Polar Sea. With the prevailing winds you may find the Polar Sea always clear of ice in that part; during the navigable season therefore it is nothing extraordinary to find open water as stated. Off the northern coast of Banks Land, we (in the *Investigator*) saw a space of open water, and we might have supposed, on evidence quite as conclusive, that we saw an open sea extending from that point right to the Pole, had we not been previously aware that Melville Island was in the same meridian. An officer whose observations were generally accurate estimated the extent of water seen at 11 miles, which I think a very close approximation to the truth. Ice was of course beyond it, but owing to the prevalence of the S.W. winds it had been driven off the shore. An observer in that direction would have come to the same conclusion that Dr. Kane did, that the sea extended to the Pole, had he not been aware of the existence of Melville Island. I may also state that in the *Investigator* we found open water extending no less than 90 miles to the northward, off the mouth of the Mackenzie River; but were ultimately arrested by an impenetrable ice pack. Had we therefore not sailed through this space of open water until our progress was arrested by the ice, we might with equal or indeed greater probability have stated our opinion that we had discovered the great Polar Basin. Before I sit down I wish to express the admiration that I have always entertained for the zeal and enthusiasm with which Dr. Kane pursued that voyage. But I must reserve to myself the right to criticise the judgment which he exercised in many respects. I must therefore state my conviction that this much talked of Polar Sea or Basin, as it is sometimes called, has no existence except in the vivid imagination of those who feel disposed to portray it; and I have almost universally remarked that the advocates for its existence are those who are least capable of forming

an opinion on the subject, from never having been in the Polar Sea. From the analogous cases I have mentioned, therefore, and numerous others which may be found in the records of Polar voyaging, we must, I think, arrive at the conclusion that the opinion advanced by the enterprising and lamented Kane is not supported by evidence sufficiently trustworthy or conclusive to establish the fact, and we must consequently ignore the existence of an open Polar Sea in the position indicated.

The PRESIDENT, in concluding the discussion and in complimenting the gallant officers who had spoken on the ability they had shown, expressed the gratification he had experienced, in common, he was sure, with all present, in perceiving that nothing had been said which could in any way affect the noble character and high merits of Dr. Kane; for it was chiefly the account given by Morton as to the extent of his rapid excursion northwards which had been called in question. Again, as respected the formation of the Greenland glaciers, Dr. Rink, who had studied them for several years *in situ*, had long ago published his views upon that subject.

In answer to a question from the Chair—

SIR GEORGE BACK said—I hardly know how to answer that question, because Dr. Rink, in speaking of the Humboldt Glacier, does not throw any doubt upon its formation, or the similarity of its formation to any of the glaciers in Omenak Bay. I think his idea is, that it does not extend 1200 miles, or as Dr. Kane supposed from where he saw it to Cape Farewell. He gives it as his opinion that the glaciers inside first fill up the valleys, gradually accumulate until they cover the hilltops, and then form plateaus; but with eight or nine years' experience, it appears he was unable to ascertain their extent.

Eleventh Meeting, Monday, April 26th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*The Right Hon. John Wynne*, M.P., *and Dr. John Shea*, R.N., *were presented upon their election.*

ELECTIONS.—*Major-General Duncan Alexander Cameron*, C.B.; *the Hon. Henry Coke; Captain J. Somerfield Hawkins*, R.E.; *the Ven. Archdeacon, Hugh Willoughby Jermyn; Dr. John Lister; and J. N. Fazakerley; John Robert Godley, Assistant Under-Secretary of the War-Office; Thomas Guisford; and George Stoddart, H. M. Consul at Madeira, Esqrs., were elected Fellows.*

ANNOUNCEMENT.—It was announced that Captain Irminger, of the Royal Danish Navy, had written to state that letters addressed to Captain M'Clintock, and the officers and crew of the Arctic expedition, might be forwarded to Greenland viâ Copenhagen.

The Paper read was:—

On the Importance of opening the Navigation of the Yang-tse-Kiang, and the Changes that have lately taken place in the Bed of the Yellow River, &c. By WILLIAM LOCKHART, Esq., F.R.G.S.

MR. LOCKHART's paper has been compiled from various sources, free use having been made of Biot's description of the cities of China

and of Dr. Williams's 'Middle Kingdom,' as well as of several native authorities and native maps.

He begins by showing the paramount importance of the Yang-tse-Kiang River as an inlet into the Chinese empire. It traverses the whole of its centre, it passes through its most fertile provinces, at least 100,000,000 of people live upon its banks, and it is the highway of an immense commerce. He contrasts it with the Hoang-ho, or Yellow River, which, turbid and rapid, and constantly bursting its banks and devastating its neighbourhood, is called by the Chinese "The grief of the sons of Hon."

The Yang-tse-Kiang rises in Tibet, and enters China at the richest metallurgical province of the whole empire, from which point down to the sea its course and tributaries are traced in Mr. Lockhart's paper. Between the provinces of Hu-nan and Hu-pe, where coal and iron are extensively worked, its volume is doubled by numerous affluents that drain an enormous territory on either hand. Three immense cities lie close together at the confluence of the Hankiang, 500 miles from the sea, where the river has a breadth of from two to three miles, and depth of water amply sufficient for vessels of from 300 to 400 tons. The names of these cities are Wouchang-fu, Han-yang, and Han-chow. Before the late rebellion they contained between them 5,000,000 of people. The great barter trade between the northern and southern provinces of China passes through Han-chow, and the traffic from the three cities is immense, and reaches in all directions to the most distant parts of China. Mr. Lockhart considers that access to this district ought certainly to be secured to us: it appears to be the most important mart in Asia; half the Manchester and Leeds goods that are sent to China have already found their way there. If a line of European commerce were opened, sea-going ships would leave their cargoes at Shanghae, and steamers would be employed up the river.

At 400 miles from the sea the tides are perceptible: the large American steam-frigate *Susquehanna* reached a point 300 miles from the sea, and the British fleet in 1842 anchored off Nankin, the old capital of China, which is 200 miles from the coast.

The volume of water in the Yang-tse-Kiang is much greater in summer than in winter, owing to the melting of the snows and the heavy rains.

The Hoang-ho, or Yellow River, is rapid, tortuous, and turbid with mud, deposit of which has raised its bed to a greater height than the country through which it flows. It is useless for navigation. The continual repairs necessary to keep its banks in tolerable security create an immense drain upon the Imperial

treasury, and having been comparatively neglected since the outbreak of the rebellion, a fearful disaster occurred two years ago. The river entirely broke loose from its previous bed, and after inundating a large part of the province of Shan-tung, its erratic waters have found a new exit to the ocean in the Gulf of Pecheli.

Mr. Lockhart's paper closes with an account of the rise and progress of the Chinese rebellion. It would appear that its force has become greatly expended, and its ultimate success very questionable.

The President called upon Captain Collinson and Captain Vansittart to state their opinions respecting the navigability of these rivers, particularly the Nankin River, which was navigated by British ships during the late war, and which a former President of the Geographical Society, Lord Colchester, ascended in boats to a distance, he believed, of 200 miles higher than any other officer. There were questions which as a geologist he should like to put to Mr. Lockhart. Whence came the coal which was found piled up on the quays near Nankin, when our steamers ascended that river? Whence came the fossil shells which Mr. Lockhart had given him—shells which established a complete identity between the formations in the centre of China and those of Belgium, Germany, France, Russia, and our own islands?

Captain R. Collinson, R.N., F.R.G.S.—Nearly all I have to communicate has already appeared in the memoirs of this Society, published on my return in 1846, in conjunction with Lord Colchester. The knowledge we personally obtained bears out to the fullest extent the opinion of Mr. Lockhart, that we have in these rivers the means of penetrating into the interior of the country. There is nothing I conceive which can tend more to the establishment of peace and amity between that vast country and our own, than that we should exhibit our power by sending our steamers up into the interior by means of the Yang-tse-Kiang. That it is capable of navigation up to Nankin for line-of-battle ships has been proved beyond a doubt. Beyond that we do not know exactly what is the depth of the river; but reasoning from analogy we can prognosticate that steamers will go more than 1400 miles above Nankin. With respect to coal, it is the fact that we found the coal ready piled for our use on the banks of the Yang-tse-Kiang at Ching-kan-fu and Nankin. The change of course in the Yellow River, mentioned by Mr. Lockhart, must be peculiarly interesting to geographers, showing how necessary it is, in dealing with the drainage of an extensive country like that, to give attention to its physical condition. It appears that the Chinese have gone on building up a course for that river until they have actually raised the river above the surrounding country. The consequence has been that it is a source of great disaster. In addition to the introduction of steamers into the interior, I believe one other great advantage which will result from the onslaught we are now making into China will be to show how they can get rid of their water better than they have been able to do hitherto.

Captain E. W. Vansittart, R.N.—With respect to the trade of the Yang-tse-Kiang, I have had opportunities lately, that is in the year 1855, of seeing thousands of junks coming from the north and passing up that river. On one occasion in the gulf of Leotung, not far to the north of Pekin, we found more than 700 junks deeply laden, of the value of from 1000 to 2000 dollars each, which were coming south. These vessels would return north again with British goods obtained from Shanghae. The importance of this trade has yet to be developed, and steam will be the means of doing it. With respect to the trade with the north, I think a light woollen cloth would answer much better

than a more expensive article. In the city of New-Chang, north of Pekin, the people can scarcely bear the severity of the winter; and no doubt if they could get a cloth cheap, such as they obtain in a roundabout way from Russia, they would be glad to make use of it. With reference to the trade of the Yang-tse-Kiang, it would be well to take notice of the impediments to it caused by hordes of pirates, who have been assisted by renegade Englishmen and Americans. When the value of the trade is discovered (I have found junks laden which the natives themselves estimated to be worth 30,000 and 40,000 dollars), I have no doubt that the extreme peril to which that trade is exposed will be taken more notice of, and that the pirates will be entirely suppressed. I had the honour of belonging to the expedition which went as far as Nankin in 1842, and I can bear testimony to what Captain Collinson says as to the immense quantities of coal piled up by the Chinese, which our steamers made use of.

MR. CONSUL ALCOCK.—Mr. Lockhart has drawn the attention of the Society to that part of our relations with China which I think certainly most interesting and important—that is, to the geographical features of the country, and its influence on our commerce. I think it was Professor Owen who some time ago remarked that the physiological and geographical condition of a country had more to do with its character, its liberty, its commerce, than perhaps any other feature. It is an observation which I think we too often lose sight of. In China particularly is this remarkable. By referring to the map it is very easy to demonstrate this truth. There is a great chain of mountains running down from Ningpo to the southern coast, which renders it quite impossible for any extensive trade to be carried on from those ports intervening between Ningpo and Canton, inasmuch as the rivers throughout that extent of country take their rise from opposite sides of the mountains. But by obtaining access into the interior by means of the Yang-tse-Kiang you come in contact with an extensive tract of the finest country in the world. The banks of this noble stream are thickly covered with populous cities, and thousands of junks are to be seen sailing up and down its waters conveying the produce of one part of the country to another. The Yang-tse-Kiang stands unrivalled by any other river in the world as regards its population, its wealth, and the enormous traffic that takes place. It is difficult to bring statistics to bear upon matters connected with trade, or with any other subject, even with population, in China; but I am quite satisfied from what I have seen and from all the knowledge that has reached me, that we have no conception in England of the vast extent of the inland traffic of China. There is a greater trade carried on between the eighteen provinces of China than between all Europe and the rest of the world. If we wish to have a share of that trade, and to carry on a commerce that shall be mutually beneficial, we must get the right to traverse that great stream, the Yang-tse-Kiang, to which Mr. Lockhart has so ably drawn our attention. We must go up to Hang-chow, a city which extends some twenty miles along both sides of the river. There alone we should find a new market for our manufactures, and a means of distributing them in the interior among millions who have never heard of them. Although some of our goods may go up the country, I am certain the great bulk do not extend a hundred miles beyond the ports where they are landed. In my opinion we shall never make any progress until we have gained these two points—free access to the tea and silk districts and the central marts there, and the right to traverse the Yang-tse-Kiang and to enter the great cities on its banks. As regards our political relations, I think until we have direct relations with the court of Pekin, based upon a rational footing, that we shall always be met by anomalies and contradictions. With these points gained, the whole of China would be opened to us, and our commercial hopes, which have hitherto been doomed to disappointment, would I believe in a few years be more than realised.

MR. JOHN CRAWFURD, F.R.G.S.—I have never been in China, but I have had much intercourse with Chinese, have even exercised authority over them, and, therefore, know them tolerably well, and I have even made China itself in some measure a study. The Chinese are a very ingenious people; they invented tea, porcelain, paper, and printing; but they have never been able to put two syllables together. That is a remarkable fact. Their oral language is extremely poor; but they have a written language which I believe is tolerably copious, hieroglyphics like our numerals—a language understood by the eye and not by the ear. The oral languages are said to be no fewer than eighteen, corresponding with the eighteen provinces of the empire. I am given to understand that not one of them contains more than 1200 words; that is to say, not more than one-fortieth of the number in our own language. I have seen a Chinese play, and the language is so imperfect that the actor has been obliged to cut a hieroglyph in the air with his fan to indicate what he meant. With respect to the Yang-tse-Kiang being the largest river in the world, it is not so; but it is certainly one that has the greatest population and the greatest amount of industry on its banks. I think the population of its great plain is somewhere about 100,000,000, or about three and a half times the population of the United Kingdom. In stating that the internal trade of China exceeds the trade of the whole of Europe with the rest of the world, I think Mr. Alcock has considerably exaggerated the real state of the case. From what I know of the Chinese, I believe it does not amount to one-tenth part of the internal commerce carried on by the nations of Europe among themselves, apart from international commerce. One advantage to us of the Yang-tse-Kiang consists in its affording us the means of controlling the Chinese, and dictating to them terms of fairness and justice in our intercourse. We availed ourselves of this means on a former occasion, and in my opinion we shall be obliged to do so again. The objection to going up the Yang-tse-Kiang, I am told, is that the Tye-pings, those vagabonds who have been in rebellion for six or seven years, who are far more barbarous than the Chinese themselves, and who are making a burlesque and tool of Christianity, are in possession of Nankin. No terms should be held with these people. What are the Tye-pings to us? We know nothing of rebellion in China; we recognise nothing but the legitimate government. If the Tye-pings oppose us, we must knock the Tye-pings on the head. One word upon the question of silk, and the vast importance of it to this country. When the commerce of China laboured under a monopoly, it was thought to be totally impossible to increase the quantity of silk obtained from that country. The annual export was 2000 bales, and for 150 years it was thought to be the utmost that China could supply for exportation. When the monopoly was broken up 10,000 bales were obtained; then 14,000 bales. Within the last two years, in consequence of the failure of the silkworm in Europe, the supply from China had enormously increased. Last year it was 94,800 bales, showing that the supply had increased forty-seven fold since 1810. In the history of foreign trades there is not a more remarkable fact.

MR. CONSUL ALCOCK.—I do not speak altogether without proof upon the subject of the internal trade of China. In the port of Shanghae there have been as many as four thousand large junks at one time. It is estimated, and has not been called in question for the last century, that from three hundred to three hundred and sixty millions inhabit that vast territory. There is a larger population than all Europe to begin with, and taken as a whole they are the most industrial and productive race in the world. They are essentially a commercial and trafficking race. You cannot go on to any canal, large or small, in any direction, without seeing thousands and thousands of boats carrying the produce of one district to another. They are a self-sufficing race, possessing as they do every production and every soil. They are in truth the

only race in the world that can be independent of every other race, as they produce everything within their own regions that man can desire, and they freely interchange them. Their coasting trade is enormous; there are hundreds of thousands of vessels passing up and down. Mr. Crawfurd made one or two observations with reference to our operations up the Yang-tse-Kiang in order to compel the Court of Pekin to listen to our terms, and he referred to the very triumphant course of our expedition up that river in 1842 and 1843. I think he lost sight of the total change in circumstances. When we went up the Yang-tse-Kiang originally, and blockaded the mouths of the Grand Canal, it was like putting our hand upon the throat of the empire; for by the Grand Canal they were in the habit of receiving all their supplies of food, and up to that time Pekin was mainly dependent for provisions upon the southern provinces. We were in a position also to blockade the coast. In the novelty of their position, with Pekin threatened and the Manchu dynasty imperilled, it was no wonder they should instantly come to terms. The circumstances are very different now. The rebels have been in possession of the mouths of the Yang-tse-Kiang for the last five years; therefore whatever mischief has resulted to Pekin from the loss of prestige and the cutting off the supplies by the Grand Canal has already been put upon them. How should we add to the pressure by going there too? We should only come in contact with the insurrection, the limits of which we could not foresee. It is certainly not desirable that we should come in immediate contact with the rebels, or enter into relations with them. There are strong reasons why we should not mix up ourselves with them, and there is no hope that our going there would in a political sense have any influence upon the people of China.

DR. M. TRUMAN, F.R.G.S.—I may state, in corroboration of the assertion that our manufactures have not penetrated far into the interior of China, that most of the British goods taken to Shanghae are sold to pedlars, who carry them on their backs. It is not likely that these men taking such small packets could travel any very great distance. Another peculiarity about our trade with the Chinese is, that there is more of bartering than of commerce. They are disinclined to part with silver in purchasing our goods, and our merchants are in fact obliged to receive the produce of the country. Works of art have even been taken in exchange for our manufactures, and a number of curiosities brought to this country have been sold at good prices and produce large profits. I recollect on one occasion a friend of mine was obliged to accept a large quantity of rhubarb. He had some doubt whether it would find a good market in England. It turned out, however, to be of such excellent quality that he was perfectly satisfied with the arrangement he had made.

The system of barter in China operates as a great obstacle to large commercial transactions, and nothing would tend more to increase our trade with the Chinese than inducing them to pay for the goods they purchase of us with specie, which at present they are extremely reluctant to do, keeping their silver and other precious metals hoarded up in their houses.

In answer to a question—

MR. PLINY MILES, of the United States, said—I believe the number of Chinese who have gone to St. Francisco and different parts of California have for several years amounted to from 10,000 to 13,000 annually. Within the last three years that number has considerably declined in consequence of certain political reasons. As to the number that has gone to Panama to reside, I do not believe it has exceeded fifty during the last five years. With regard to Peru, I think those who have proceeded there have gone almost entirely under contract with guano ships; but to California it has been a voluntary emigration. There are several Chinese merchants at St. Francisco, and they have sent out vessels or money to China to bring over their countrymen. The complaint against the

Chinese in California is that they seem more disposed to save their money than to spend it. They will not gamble or throw away their money foolishly. I do not wish to speak against the laws and regulations of my own country, but there are one or two circumstances connected with the Chinese on the Pacific coast which have more than a geographical interest. When there was a recommendation from the Governor of California to place some restrictions on the Chinese coming there, to make them pay a heavy tax, not in proportion to the trouble they put the State to, but in proportion to the amount of money they were supposed to lay up, the Chinese very justly remonstrated against it, and they drew up a paper, which was conceded to be a much more able document than the one which emanated from the Governor himself. At any rate the Legislature did not pass the law. I will make one remark with reference to the Chinese river system. It has both a commercial and geographical signification. Geographically speaking, the river system of China is very similar to the river system of North America. Perhaps in civilised and commercial countries there are no two rivers so nearly alike as the river Yang-tse-Kiang and the Mississippi. But there is this difference, that while one has a population of 100,000,000 on its banks, the other has not more than 10,000,000 or 12,000,000. Now, when we come to consider the immense number of steamers running on the Mississippi to supply the wants of those 10,000,000, we can form some idea of the enormous number of vessels there must be on the Yang-tse-Kiang to supply the wants of that vast population of 100,000,000 or more. The Mississippi and its tributaries have in constant employment more than one thousand steamboats, and many of these of very large size. The Wabash canal connects the navigable waters of the Ohio with the great chain of lakes in the north, but there have been no railroads of any extent near these rivers until within the last six or eight years. The figures given of the number of steamers on the great river intersecting the interior of North America apply to a period before the main stream was intersected by one canal, before the whistle of the locomotive was heard on its banks, and before the entire valley had one town of a hundred thousand people. Were the same class of steamers introduced on the Yang-tse-Kiang that run on the American rivers—vessels drawing from 13 inches to 3 feet of water—it would inevitably give an enormous impetus to the traffic of that great river.

MR. GEORGE RENNIE, F.R.G.S., quoted the opinion of a correspondent as to the amount of trade that would result from navigating the great rivers which traverse the interior of China, and the importance of opening out that trade by means of vessels such as the gunboats recently sent out by him to India, which only draw 2 feet water; and with reference to the Yang-tse-Kiang said, that, if not the largest, it was the longest river in China—it was 2800 miles in length, and it drained a basin of 136,800 square miles. The Amúr river was only 2380 miles in length, but its basin was 145,000 square miles. The Hoang-ho was 2230 miles long, and it drained a basin of 134,400 square miles.

CAPTAIN E. W. VANSITTART, R.N.—A question has been asked about the Chinese emigrants. I have seen them shipped at Swatow, and so far as I have seen they are placed very comfortably on board, and seem very happy to go. One of the gentlemen who criticised Consul Alcock's remarks about the extent of the internal trade of China, also made some remarks about the barbarities of the rebels as compared with the conduct of the Imperialists. We have all heard what Commissioner Yeh did at Canton. All I can say, in confirmation of the Imperialist barbarities, is this, that upon the retaking of Amoy they executed some 1400 in about fifty minutes, until the very sea round us was covered with blood; on landing upon the wharf I had the gore running over my shoes.

The REV. W. C. MILNE.—The paper which my friend Mr. Lockhart has laid before us this evening has brought to recollection many of my most intimate associations. But to refer briefly to the theme of that paper, he has

described the grand plain of China, and the commercial importance of that part of the country. Upon the latter point the Chinese themselves admit that their four most important marts are in the interior. In this remark of theirs they do not refer to the seaports, but to distinct inland marts. These are Fuh-shan, called in Canton patois *Fat-shan*, which has recently been visited by the British forces; *Chu-sín*, 12 miles from *Kai-fung-fú*, on the banks of the Yellow River; *Han-chow*, and *King-tih-chin*—three of these markets lying in the plain of the *Yang-tse-Kiang*. Every one who looks at the state of the case must view with the greatest anxiety the results of our present onslaught at Canton; and we cannot but believe that the ultimate result will be the opening of the great plain of the "Flowery land" to foreign intercourse of every description. We shall find there opportunity enough for adventure and enterprise, as well as for the advancement of commerce and civilisation.

MR. B. WILLIAMS, F.R.G.S.—Allow me to say one word after the remarks the gallant Captain has made. He said, I think, that we had not gone up the river beyond Nankin. Perhaps he is not aware that Captain Fishbourne of H.M.S. *Hermes* sent a boat 9 or 10 miles above that city in the year 1852. My son, now Lieutenant Frederick Williams, had command of that expedition, and found in that distance that the river varied in width from half a mile to between 6 and 7 miles, and that in places there was only depth for a steamer of very light draught of water. Captain Fishbourne has published his observations on the moral and social condition of China.

I think, Sir, with your permission we ought to make some slight protest against the remarks of Mr. Crawfurd. He designated the rebels rather harshly. According to Captain Fishbourne they have, at any rate, overthrown idolatry. They receive the word of God with the greatest deference and eagerness. They call us brothers, and they are themselves engaged in printing the Bible to a very large extent. So far there seems to be an incipient degree of civilisation, to say the least, amongst them.

MR. CRAWFURD.—A few words with reference to what I said about the Imperialists and rebels. I did not say that the Manchús were a civilised and humane people. I said the rebels were barbarous. I believe they are both of them barbarous, and I see only a small distinction in favour of the Manchús. I think I am entitled to say so much, because the Manchús have governed China 200 years; and on the whole they have governed it better than any other Asiatic state has been governed. With respect to the Tye-pings, of whom some gentlemen are disposed to think favourably, I cannot think favourably of a people that destroy whole cities and massacre the inhabitants in cold blood, for this they have done over and over again.

MR. LOCKHART.—Twenty cities.

MR. CRAWFURD.—And as for treating with them, Sir George Bonham went up to Nankin, and endeavoured to hold intercourse with them; and they were too proud even to give him an interview. The principal leader calls himself the Brother of the Saviour! What respect can be entertained for a party that uses or believes such abominations? For six years these people have been committing murders and devastation, but they have made no essential progress. They crossed the Yellow River five years ago; they were beaten by the Manchús; and out of an army of 40,000 men, only 5000 returned to Nankin. There they have continued ever since in possession of a small part of the country around Nankin, beyond which they have made no progress whatever. I really do not see that we should be interrupted by a people of that description. I have one observation to make with reference to what fell from Mr. Alcock. He thinks that our intercourse with China cannot be carried on satisfactorily unless we have a legation at Pekin. From that opinion I totally dissent. I have been myself in a position somewhat similar. I was once sent as an envoy to the Birman Court, which is 400 miles up the Irrawaddy, and

1400 miles from Calcutta. I found myself completely isolated. I was treated with distrust and suspicion, and I found my situation there so uncomfortable that I strongly recommended to the Government to withdraw the mission. They did not, but persevered for several years in maintaining one. At last the envoy was kept four months on an island in the Irrawaddy without being even vouchsafed an audience, until the whole party fell sick, and then the Indian Government came to their senses and permanently withdrew it. Now, an envoy sent to Pekin, 1000 or 1200 miles from the seacoast, and 15,000 or 16,000 miles from Great Britain, would be in a much worse position than I was; and I am perfectly sure that any attempt of the sort will prove a total failure.

The PRESIDENT.—One of the remarkable facts pointed out by Mr. Lockhart has not been alluded to in the discussion,—the change of the course of the great Yellow River. By not keeping up its raised banks, that river has entirely changed its course. It was stated that this was a phenomenon almost unparalleled; but I must remind my friends, that the Oxus, a very mighty river, is supposed by Humboldt to have also changed its course; and that, having formerly flowed into the Caspian Sea, it was by some slight change of the land deflected into the Aral. Also in our own times the river Syr Daria, at the southern extremity of the Russian steppes, has equally been diverted into a new channel.

MR. W. LOCKHART, F.R.G.S.—In respect to the remarks on the language, I wish to state that it is not correct that either the spoken or written language of China is defective or imperfect: when properly spoken, it is as intelligible as other languages, and the action used in dramas, is not to supply the want of elocution, but rather to illustrate the subject. If the Yang-tse-Kiang is not the longest river in the world, being 3000 miles long, it is certainly the most important, having so many populous cities containing 100,000,000 of people on its banks, and because it traverses the centre of so rich and productive a country as China is. In answer to the gentleman who says that the trade is carried on in China by a species of pedling, I remark that this is not the case, for the trade in China is characterised by larger transactions than are common in other countries, which is evident when it is borne in mind that the trade of Shanghae alone in exports, is about 12,000,000*l.* sterling per annum, paid for by Manchester and Leeds goods, bar silver and opium. The lacquer-ware and rhubarb form a very subordinate branch of the trade. The Chinese who buy silk and tea in the interior are largely trusted by the merchants sending them, who commit to their care large sums of money, for which after some months' interval the produce is sent to Shanghae. As to Mr. Crawfurd's remark that he hoped there would not be a British Minister at Pekin, I, on the contrary, most fervently hope that in any new treaty the Government will not only secure the navigation of the great rivers, but will insist on the residence of a minister at Pekin, as without that, we could not secure friendly relations with China. If this be not obtained, we should as in the present instance be soon hurried into another war, the chief cause of the present war being the impossibility of communicating with the Court of Pekin when any troubles arose at the ports. I hope when entrance is obtained to the interior that a rigid system of passports will be established; that no person will be allowed to enter China who is not answerable to the control of some consul at the ports, otherwise the same thing will occur in the interior as I have known take place near Shanghae, namely, that half a dozen Europeans and Americans, under the name of Germans, who have no consul there, banded together, took a walled city, levied contributions on the inhabitants, and retained possession for many months, the Chinese authorities having no power to displace them.

Twelfth Meeting, Monday, May 10th, 1858.

COLONEL GEORGE EVEREST, VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Augustus F. Birch; Edward Burmester; John Lister*, M.D.; *James Ewing Matheson; John H. Nix; and Thomas G. Staveley, Esqrs., were officially presented upon their election.*

ELECTIONS.—*Viscount Stratford de Redcliffe; the Rev. Charles John Armistead, Chaplain*, R.N., *Hong Kong; and Thomas Braddell, Magistrate of Penang; Augustus H. Chetwode; John Pole Mayo; Charles Edward Mudie; R. Banner Oakley; L. E. R. Rees; Conway M. Shipley; and Joseph Somes, Esqrs., were elected Fellows.*

EXHIBITIONS.—Major Papen's Geological Map of Central Europe, by Ravenstein; two Coloured Views, illustrating Bourne's new System of Indian River Navigation; and Views of Honduras, showing the Route of Inter-Oceanic Railways, were exhibited at the Meeting.

ANNOUNCEMENTS.—The CHAIRMAN reminded the Fellows that the Anniversary of the Society would be held on Monday, the 24th instant, at the Society's House, 15, Whitehall-place, at one P.M., when the Royal Medals would be presented to Captain Richard Collinson, R.N., C.B., and to Professor Alexander Dallas Bache, of the United States Coast-survey, by the President, Sir Roderick Murchison, who would then deliver the Annual Address on the Progress of Geography; and in the evening the usual Dinner would take place at the Freemasons' Tavern, at seven o'clock, and those gentlemen, who purposed supporting Sir Roderick, were requested to apply at the Society's Office for tickets as early as possible.

The Papers read were—

1. *Notes on the Physical Geography of North-West Australia.* By MR. JAMES S. WILSON, Geologist to the North Australian Expedition.

Communicated by SIR RODERICK I. MURCHISON.

A CONTINUOUS table-land runs parallel to the whole coast of North-Western and of Western Australia. It begins at the North-West horn of the Gulf of Carpentaria, and ends at Cape Leuwin, the South-West corner of the continent, and its summit averages 300 miles from the sea, and 1600 feet of altitude above it.

The rocks that compose this table-land belong to the carboniferous era, are marine deposits, and have undergone frequent submergencies since their first elevation. They consist of four strata: 1st, A red

ferruginous sandstone, originally 300 feet in thickness, but which has been largely denuded by the sea, that has drifted its mud to lower levels; 2ndly, A compact siliceous sandstone, with hardly a trace of stratification, which forms the surface of the many flat-topped hills met with in the country; 3rdly, A clay slate, that decomposes into a reddish clay and a very productive soil; and 4thly, Limestone. The general dip of all these is to the North-West.

The Plains of Promise, and many other low plains that border the sea-coast, are formed of red sandstone, which has been degraded by the sea subsequent to its first formation, and has been drifted and deposited anew in its present station. Most of the islands in the Gulf of Carpentaria are of the same nature. This kind of soil is occasionally covered with a productive alluvium, but is poor and unfertile in itself. Where the second stratum, the compact sandstone, has been cut through by rivers or by ancient sea action, the shale below is deeply worn away, and even now the sides of the ravines may be observed to be continually undermined and the hard overlying rock breaking off and falling in. In this way are formed the extensive plains that run parallel with the dividing ridge and the coast, but separated from the latter by detached masses of cliff-topped hills; their soil consists of a rich and deep clay, through which the limestone sometimes protrudes. Trap plains occur in the higher part of the table-land.

Perhaps on no part of the Australian coast are there so many rivers navigable to a distance exceeding 50 miles from the sea. Of these are the Victoria; the Glenelg, whose mouth is still unknown; the Prince Regent River, the Adelaide, and the Liverpool.

The Meteorological Register that was kept at the camp on the Victoria River, lat. 15° 30' S., gives the following results:—

	Mean Temperature at			Max.	Min.	Rainy Days.
	°	°	°	°	°	
October .. 1855	..	..	..	..	..	1
November .. ,,	81·0	100·0	93·0	106·0	69·0	12
December .. ,,	79·0	94·0	87·0	105·0	73·0	20
January .. 1856	78·0	94·5	86·0	104·0	71·0	15
February .. ,,	78·3	92·3	86·5	99·0	75·0	19
March .. .. ,,	79·3	96·0	89·5	102·0	75·0	8
April .. .. ,,	75·3	91·2	85·3	98·0	69·0	6
May .. .. ,,	66·6	91·8	84·7	96·0	60·0	0
June .. .. ,,	59·0	84·4	77·5	97·0	47·0	3
July .. .. ,,	59·0	87·0	80·0	97·0	49·0	..

North Australia is eminently a grassy country, not only from the abundance of its grasses, but from their variety. In no part of

the world has the author seen grass grow so luxuriantly. Timber for rough purposes is abundant: it consists chiefly of inferior kinds of eucalypti. The edible fruit-products are numerous; three sorts of figs, two fruits resembling grapes, the Adansonia, wild rice, wild yams, and a production like potatoes. The quadrupeds are the same as those in the south; the birds are different. An immense gathering of migratory bats, nearly as large as flying foxes, were once observed; they were millions in number, and extended to a mile, darkening the air, bending down the branches of the trees by their weight, and diffusing a musky smell. Some curious kinds of fish were met with; one that caught flies by squirting a little jet of water upon them as they settled upon leaves 2 or 3 feet off, and washing them into the river; and another that appeared amphibious, elbowing itself across sand or rock with its fore fins, and now and then making a bound. The natives are not numerous, and are clearly of the same race as those in the South. Some break out their two upper front teeth, and some circumcise. They have no huts, but live under screens of boughs. Circular stone structures are occasionally found on hill tops; they appear to be lookout stations. The natives carry no other arms than spears; one kind is short, like an arrow, for killing birds, another is long and pointed with stone, a third is barbed for catching fish. Few, if any, boats or canoes are used by them; they sit astride on logs of wood when they cross rivers, and, in the Gulf of Carpentaria, they employ large raft-like bundles of the dead stems of mangrove trees.

The CHAIRMAN.—We are, I think, greatly indebted to Mr. Wilson for the interesting paper which has just been read, and I very much regret that our estimable President is not in his place to render full justice to the valuable geological details which it contains. For my own part I am free to avow, that though, from the description given, I can form a general idea of the nature of the tract described, yet I feel by no means sufficiently master of the subject to offer any remarks worthy of the notice of this Meeting. It is evident from Mr. Wilson's description, and we have also learned from the statements of Mr. Gregory and other sources, that in Northern Australia there are vast tracts of valuable land at present lying waste which are admirably suited for pastoral purposes, and, perhaps, for those of agriculture; but the serious question which we have to solve is how those tracts are to be made available to humanity. The fact stares us in the face, that they seem to be limited by the 18th parallel of latitude; and we may, I think, lay it down as an universal rule, that within the tropics the English race cannot colonize, unless the climate be moderated by elevated lands, such as in the case before us do not exist; that is to say, that they cannot cultivate the land and labour in the fields. True, they may superintend with efficiency the labours of others, just as we know the indigo planters in India, the sugar planters in the West India Islands, the growers of cotton in the southern parts of the United States are used to do, but that is not, strictly speaking, colonizing; for the outdoor work, and all toil needing protracted exertion in the open field, are in all these instances performed by natives of another region,

better adapted to stand exposure to the extreme heat of the sun and the vicissitudes of the climate. If the slave-trade were still in its flourishing state, there would be a ready mode of evading this difficulty, for we should then only have to open a communication with the slavers of the African coasts and the piratical rovers about Borneo, Celebes, and other places in the Malayan Archipelago, and obtain as many *human implements* as enterprising individuals might desire; but fortunately this once *highly prized traffic* no longer exists as a recognized and legitimate trade. We might obtain Chinese labourers, perhaps, sufficient in numbers and with hardihood adequate to cope with a tropical climate; but if we are to trust to the statements given in the newspapers from time to time, we cannot but conclude that there are already too many of that exclusive and singular race in Australia, and rather than augment their number, a counterpoise is needed to keep their arrogance within bounds. They are, by all accounts, a people whose habits never can harmonise with those of Europeans; they can never become loyal subjects of Great Britain, but always form, wherever they go, a community of their own—an *imperium in imperio*, in fact. Are we then to view this land of mineral, pastoral, and arable capabilities at a distance, as a mere curiosity, like the mountains in the moon, or the belts of Jupiter, or the ring of Saturn, and turn it to no account, and this, too, whilst it is within our clutch, forming part of the dominions of Great Britain, and of the inheritance of our descendants? Is it for this that toilsome and costly expeditions have been organized and sent forth just to say *veni, vidi*, and then to leave our hopeful discovery as we found it, to be possessed by a wretched set of unredeemed and irreclaimable savages, who turn these natural advantages at their disposal to no account, but live upon snakes and such other reptiles as are witless enough to allow themselves to be caught napping within reach of their bumerangs and spears, and girdle themselves with belts in order that they may take in or let out a reef, according to the state of their larder? I think you will answer, Certainly not. The plan which I think we ought to adopt is to make in this tract a penal settlement for natives of India, and the time is now most fitting for giving effect to this arrangement. We have had a tremendous rebellion in India. We have slaughtered, and our countrymen and women and children have been slaughtered, to a most fearful extent; and though I have not a word to say in behalf of those who have imbrued their hands in the blood of the innocent, helpless, and unarmed, yet many, I feel assured, there are amongst those now in arms against us who have been merely playing the game of follow-my-leader, and had in the origin no notion whatever that things would have come to such a frightful pass. Those who know anything of the natives of India, and particularly of the class of whom the Bengal army was composed, must be aware that a very large portion consists of what the French call *gobemouches*, a set of credulous gabies, without innate mischief in their composition, who go to stare at a spectacle just as the dirty boys in London go to see Punch beating and killing his wife, but without any desire to assist, aid, or abet in the cruelties, atrocities, and murders perpetrated. Now, I confess I should be very sorry to see these people indiscriminately put to death. Down with the Budmashes! Down with the actual murderers, or the participators in any of the wanton atrocities committed; but wherever we can winnow the simple *Tomashabins*, or sight-seers, from the mass, let them be preserved as the nucleus of the colony I suggest They would be most admirably suited to inhabit the tract of country so highly spoken of in Northern and North-Western Australia, which is so peculiarly adapted to their constitutions. They are in general accustomed to agricultural pursuits; some few are shepherds; and they would soon become habituated to their new kind of life, especially as the climate seems to be, as nearly as we can judge, just what they have been inured to

from their birth. This, I think, is the very best, if not the only, means by which we ever can redeem those beautiful tracts of land regarding which we have this night, and on so many previous occasions lately, had our interest excited, from their present forlorn and desolate state; and if this succeeds as a first attempt, we may then have some hope of developing their resources, with advantage to Great Britain and her descendants, and to mankind at large.

MR. TRELAWNY SAUNDERS.—The author of this paper has given us some interesting generalizations on the structure of North Australia. He finds the hills running parallel to the coast on the north-west, as they do on the eastern seabord. Flinders commenced the observation of this fact half a century since in reference to the Wessel Islands at the entrance of the Gulf of Carpentaria. It was afterwards commented upon by Dr. Fitton in his appendix to King's Australian Voyages. Leichhardt next found the range which he crossed near Port Essington pursuing the same direction; and Wilson has now observed the same feature still farther south.

Mr. Wilson adopts Captain Sturt's views with regard to the interior. He also thinks that the range on the north-west of Spencer Gulf stretches across the continent to the elevated country on the North-West coast. So far as the climate of the interior is concerned, it seems to me that Captain Sturt's journeys, and the appearance of the Western coast, confirm its similarity to the analogous region of Northern Africa. Like Northern Africa, Australia presents a broad extent of land intersected by one of the tropics, and exposed to the prolonged influence of the vertical sun during the solstice. Burnt up at one season of the year, it may be deluged at the other without retaining any source of water like the Nile or the Ganges, capable of resisting the intolerable heat and dryness so impressively described by Captain Sturt.

With reference to the important question of establishing settlements on the North coast, I think we should follow the precedent set by Sir Stamford Raffles in the highly successful occupation of Singapore.

If the Government would form a small establishment on the spot for the survey, allotment, and sale of land, and for the maintenance of civil authority, those people would find their way there, as they did at Singapore, who deemed themselves best fitted for such a country. The population of North Australia whenever it springs up will necessarily be Asiatic as well as European. The native traders of the Archipelago will there meet with European merchants and colonial cattle owners. No direct migration of European labourers is desirable.

The failure of Port Essington arose from its having been regarded and governed as a purely military post. The Australian colonists who would have driven their cattle to that part of the country were expressly prohibited. The native traders of the Archipelago looked upon it as a stepping stone to some encroachments on the adjacent islands; and the settlement was broken up as soon as its peaceable nature was perceived and traders began to frequent it. There can be no doubt that population and trade would speedily be attracted to North Australia if titles to land were procurable, and civil authority duly established.

MR. JOHN CRAWFURD, F.R.G.S.—I think it was stated that the highest land discovered is about 1600 feet, and that the distance of that land from the sea is about 300 miles. It is clear, then, that there can be no great river in a country of that description. No great rivers exist in any part of the world, and especially the tropical world, except where there are great ranges of mountains from 10,000 to 12,000 feet high. No such mountains exist in any part of the Australian continent so far as we have been able to ascertain. It has been stated in the paper that there are 5,000,000 acres of good grass land; that it is a peculiarly pastoral country. Now what is a pastoral country? We usually understand by

a pastoral country a country fit for the production of the sheep, and the sheep in Australia is especially valuable on account of its fleece. Now, within the latitude of 12° and 18°, the fleece of the sheep will not be wool, but something very like hair. Therefore we may at once conclude that this country is totally unfit for the sheep. Then again the geological formation promises no gold, and it is the sheep and the gold which enrich Southern Australia. The country is perfectly well fitted as pasture for the ox, the horse, the hog. It would produce abundance of oxen, but what would you do with them, with nobody to eat them? It does not altogether follow that a tropical country is altogether unfit for an acclimated European. That we are perfectly satisfied of, from 300 years' experience in America. There are to be found on the low lands, on the level of the sea, in various parts of America, Europeans pretty much what their ancestors were when they left their parent country. I especially allude to the Spaniards. Only a night or two ago I saw a whole family of descendants of Spaniards who had been 300 years in America, and in the ninth degree of latitude, at Panama. One lady was exceedingly beautiful, and as fair as her ancestors when they left Toledo, for to that town the family traced its origin. Now, when Southern Australia, or such portions of it as can be occupied, is peopled to something like the extent of our own islands, namely, from 200 to 300 inhabitants to the square mile, its people will emigrate to North Australia and settle there. But they will not do so as long as they can find an occupation in the south. When that time arrives, which may be two or three centuries hence, then North Australia will be occupied, and will have its oxen, and its horses, and its hogs, and possibly a little corn. I have no great confidence in the assertion of the author of the paper when he states that a country of sandstone formation is a fertile country. Strangers are very apt to judge erroneously in this matter from mere appearances. The author of the paper speaks of having found a little rice in a few spots on the marshy sides of rivers. My opinion is that that rice is not a native production. I will tell you how I believe it came there. There are certain Malay fisheries carried on in the Gulf of Carpentaria. The fishermen bring their rice with them in the husk, commonly called paddy, and I dare say have thrown a few handfuls of it to the natives; and it has propagated itself in these marshes. But there can be no hope of raising rice in a country that is not well watered. When rice is grown on dry land the production is about one-fourth, one-sixth, and sometimes not more than one-tenth of what it is in a well-watered country, which North Australia can never be. As to settling the country with a Chinese population, that is not very likely to succeed. The Chinese never emigrate with the women, and how are they to multiply? So with respect to the convict Sepoys suggested by our Chairman; the women will not accompany them if they lose caste, which they will do when transported as murderers and assassins. Northern Australia then is not very likely to be colonised by Sepoys or by Chinese.

MR. LOCKHART asked how far the navigable stream Victoria extended towards the southward?

MR. SAUNDERS.—About 160 miles.

MR. LOCKHART asked what was the distance between the navigable part of the Victoria and the stations which had been passed over by Sturt from the south?

MR. GALTON replied, the paper had no special information about it.

MR. LOCKHART.—I think in a paper read by yourself, you specified how travellers might go into an arid desert by means of relays, bringing supplies with them. What do you think is the distance between the extreme *limit* of Sturt's Ridge in the south of Australia and the navigable bed of the Victoria?

DR. SHAW.—About 600 miles.

MR. LOCKHART.—I would make one remark with reference to the Chinese

emigrants. I think there has been a great mistake regarding the Chinese emigrants who have gone to Australia. They were represented to me a little time ago by a member of the House of Peers to be rebellious, troublesome, and mutinous, and that at Melbourne the authorities had been compelled to restrict the entrance of the Chinese on account of the trouble they gave. Now, I think, the wants of the Chinese emigrants should be borne in mind. In their own country they are fond of domestic relations. All of them have wives and children, and of all the Asiatics they are the most domestic. When they go to Australia they are left alone, and they are obliged to seek for excitement in gambling and drinking: hence they become troublesome and disorderly persons. When there are so many Chinese emigrants in Australia, some 60,000, I think it would be desirable to offer an inducement to Chinese women to go down there and be married to the emigrants; and also to give a bonus to the Chinese who brought their wives and families with them. I think this would go far to promote quiet and good conduct among the Chinese, and to extend our dominion into the interior.

The CHAIRMAN.—I will crave permission just to make one remark in reply to my esteemed and valued friend Mr. Crawfurd. He seems in his gallantry, which quality I highly commend, to have attributed to the female sex in India a degree of innocence and gentleness which I do not think they entirely merit. If we have heard of Thugs, we have also heard of Thugnees, who are the female Thugs. Although the humane order of Sir Archdale Wilson preparatory to the storming of Delhi, which we all unite in thinking cannot be too highly applauded, forbade the destruction of women and children, yet there is much cause to believe that the women were in many instances as cruel as the men.*

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* With the approval of the President, the following note from the Author of the Paper is given:—

To the Secretary of the Royal Geographical Society.

Brunswick Square, 6th July, 1858.

SIR,—I am sorry that illness prevented my attending the Meeting of the Royal Geographical Society the evening my paper on the "Physical Geography of North-West Australia" was read, as I should have been glad of having an opportunity of replying to some of the remarks of Mr. Crawfurd.

A country may possess sufficient water without possessing great rivers; and high mountains in the Tropics do not everywhere produce large rivers, as for instance, the Andes of Western Peru send no large rivers to the west coast. Though Tropical Australia possesses no high mountains, it is well watered on its seaward slope. Mr. Crawfurd makes it appear that wool on sheep would turn to something like hair in the Tropics; but he does not seem to be aware that wool produced in Tropical Australia has already been sent to the English market. This district lies between lat. 18° and 24° south, and in being exposed to the prolonged influence of the sun during the solstice, is as hot as though situated under the Equator. Sheep-farmers in Australia say that they can prevent deterioration (if necessary) by introductions of fine woolled rams from the south.

Wool and gold were not anticipated by the first settlers in Southern Australia, and should not therefore be looked for as an inducement to settle in the North. Cotton, which is equally in demand with wool, may be produced to any required extent, and experiments in its cultivation on the poor soil at Port Essington were highly satisfactory. Mr. Crawfurd admits that North Australia would produce abundance of oxen, and then asks what would they do with them? The Australian stock-owner would say, "boil them down." And I would add that if boiling down carried on at Moreton Bay pays better than driving the cattle to the gold fields, the same process should pay still better in North Australia: hides, horns, and tallow would also pay well for breeding cattle there. From the spread of

The second Paper read was—

2. *General Historical View of the State of Human Society in Northern Central Africa.* By PHIL. DR. H. BARTH, F.R.G.S.

THIS paper is a condensed summary of the existing state of knowledge about the whole of Northern Africa, excepting only the Nilotic valley and the Western Coast. It is illustrated by a map, variously shaded and marked with dotted lines, to indicate at a glance the geographical arrangement of its subject matter. Dr. Barth commences with physical geography, and traces the outline and configuration of the Sahara. It is a sandstone or granitic plateau, raised from 1000 to 1400 feet above the sea level, and dotted over with mountainous districts, where rain water is caught by the hills and retained in the valleys, and human habitation rendered possible. These oases are of the utmost importance to the maintenance of great lines of commerce from the Mediterranean to the interior, but in themselves they are unhealthy spots and are hot beds of fever, in proportion to the abundance of their waters.

The available lines of commerce are further marked out by great bands of shifting sand hills, which form an insurmountable barrier to caravans, except at certain known spots. Moisture collects in the troughs between the sand ridges, date palms are found in them, and

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of population going on at present in Australia, in ten or fifteen years Tropical Australia will be occupied by English flock-owners to the 12th parallel of latitude; and in less than half that time, if a trading settlement be established on the north coast.

Mr. Crawfurd doubts my account of the fertility of the soil, because it is represented as a sandstone country. He may on the same grounds doubt the fertility of the counties of Yorkshire, Northumberland, and Durham—in fact any part of England where coal fields exist; but it should have been remembered that the table-land and ranges alone represent the really sandstone country, none of which is included in the estimated 5,000,000 acres of good pasture drained by the Victoria. The wild rice found by me was a different variety from that cultivated by the Malays, and was 300 miles in a straight line from their nearest fishery; that found by Dr. Mueller was 500 miles distant, and on a different water parting; nor am I aware of any rice being found near their fisheries. Besides, Mr. Crawfurd is in error in saying the fishermen bring their rice with them in the husk. In such case they would require to carry their husking-mills with them, which would be equivalent to our taking thrashing machines, flour-mills, and wheat in the ear, to use on a voyage to Australia. There are many thousands of acres in North Australia better suited for rice, in regard both to soil and water, than some I have seen used for that crop in Timor. If 20 years' experience, principally in the wilds of Australia, be not worth naming, I may indeed be considered a stranger to Australia, to sandstone country, and to fertile soil. Finally it is not necessary that the working people in North Australia should be Chinese or Sepoys. There are many thousand Christianized natives on the islands of Ombay, Kisa, and Rotté, besides people from many other islands, that would gladly move to North Australia for employment, and would settle there with their families.

I am, Sir, &c., &c.,

J. S. WILSON.

a small population exists. There are numerous other regions which are covered with isolated sand hills. Over the whole of the Sahara the temperature ranges between the extraordinarily wide limits of 80° Fahr., between maximum and minimum.

The fertile districts south of the Sahara are by no means so monotonous as they are usually considered to be. Bornu is certainly flat; it is alluvial, like the plain of the Ganges or of the Indus, but the countries on either side of it contain mountains of 5000 or 6000 feet. There is also a vast mountainous region which feeds the sources of the Senegal, Gambia, and Niger, of which we have no positive knowledge.

The population of North Africa appears to have been fed by three streams. One stream from Syria to the far west, and thence thrown back by the Atlantic; another supervening stream, that of the Berber or Tuarick race, also from the East, and afterwards thrown Southwards into the desert, where it still preponderates in excess; and, thirdly, one from Arabia, through Sennaar, that has met the former streams and incorporated itself with them between the 5th and 15th degrees of North latitude. Great stress is laid upon the fact that nearly all the tribes contain two fundamentally distinct races, the black and the red.

A condensed description is given of the intellectual and national characteristics of the great North African races, namely, the Berber, Mandingoe, Fulbe (Fellatah), Hausa, Kanuri (or Bornu), Tebu (Tibboo), Yoruba Nufe, Dahomey and Ashanti, Tombo Mosi, Baghirmi, Wadai, Darfur. The most important of these, in regard to European commerce, are the Berbers, who form a connecting link between numerous and distant races; the Fulbe, because of their importance along the Niger; the Hausa, for their distribution throughout North Central Africa, their liveliness and intelligence; and the Yoruba Nufe, on account of the position of their country by the unhealthy districts of the mouths of the Niger, and for their industry and capacity. Little is known, even by hearsay, of the Pagan nations south of those that are mentioned in the above list. We hear of Banda and of Andoma; Batta is now broken up.

The density of population, in each portion of North Africa, is estimated by Dr. Barth as nearly as his knowledge admits, and is recorded in the map. As a general average, taking the populous kingdoms and their thinly inhabited border districts together, the whole country south of the Sahara is more densely populated than either Marocco or Algeria.

The commercial importance of different districts is next examined, and the great commercial centres of ancient and modern times are

pointed out. Most decided preference is given, on many accounts, to the Niger route over that of the tedious desert caravans.

The religions of North Africa, and the spread of Islamism (originally introduced into Negroland by the Berber race), are, lastly, considered.

DR. WORTHINGTON, F.R.G.S.—I should be glad to be informed by Dr. Barth whether he realised as matter of fact an important point often stated, that the complexion of the black natives materially alters in mountainous countries? And further whether he has any idea as to the general character of the black complexion, and whether when the natives pass from the inter-tropical regions their complexion varies on sojourn correspondently with that of the country into which they move?

DR. BARTH, F.R.G.S.—In some respects I think the level and character of the country have really some influence upon the colour of its inhabitants. We find the *Jolof* settled in the delta of the Senegal and the Gambia, and they are the blackest race of Western Central Africa. We find the *Kanuri*, the very blackest race of those regions, settled round the Chád. The *Jolof and the Fulbe or Fúlas* are the same race. The *Fúlas*, who in general are the inhabitants of more elevated regions than the *Jolof*, are not so dark as the latter: they are besides also far more slender than the *Jolof*. That certainly may be due to an intermixture with the *Sissilbe* and other tribes. But with regard to Africa, it is very remarkable that tribes settled in low lands have generally a darker complexion than those settled in high lands. Yet as we find this intermixture of blacker and lighter complexion among tribes settled in the same country, I think it is not quite certain that such a difference of colour is in some measure due to the level or any other influence of the region which they inhabit or have inhabited at a former period. In some respects it may be so. In that great amalgamation of various tribes in North Central Africa it is very difficult to say what may have been the original colour of each tribe. However, we find the black-coloured Negro tribe already distinctly represented as the type of a separate race of mankind on the monuments of Egypt.

DR. WORTHINGTON.—I am glad of this explanation, because it shows that colour in a great measure arises from climate. Of course we have varieties. We know perfectly well that the Siah Poosh are white, though amongst dark Hindoos. The *Dendos* are perfectly white, although amongst the black inhabitants of Congo. We have black Jews in Hindostan and in Cochin China, and we have these varieties of the human complexion constantly arising. It would, therefore, seem that complexion is almost an accident dependent on local circumstances—an accident of the position in which a man is placed, and not the result of a colouring membrane only, as it was commonly supposed to be.

MR. CRAWFURD, F.R.G.S.—I differ totally from the gentleman who has spoken, and also from Dr. Barth. I will give you a few examples. African negroes have been settled in various parts of America up to the 30th and 35th degree, even to the 40th degree of latitude, and they are of the same colour, have the same form of features, and are the same people that they were when they were brought from Congo and other countries near the Equator. The native Americans, from Tierra del Fuego up to Hudson Bay, are all red; there is no difference in their complexion. Climate, therefore, elevation or lowness of soil, the level of the Equator or the table land of the Andes, have made no difference in their complexion. I will mention another fact. The Chinese are a yellow coloured people. They are the same complexion at Canton in 22° of latitude that they are at Pekin in the 40th degree of latitude. Whether the land be mountainous or whether it be on the level of the sea, it matters not; the complexion is not altered, nor is the physical form in any degree whatever.

Again, there is the instance I have given of the Spaniards who have been 300 years settled in various parts of America, sometimes on the table land of the Andes, and sometimes upon the very level of the sea, almost on the Equator; they are the same complexion that they were when they quitted Aragon and Andalusia. Then there are the Parsees of Hindostan. They migrated from Persia about one thousand years ago. They have kept themselves free from admixture with the Indians, and they are as fair at this day as when they left the mountains of Persia, although they are settled at Bombay in the 18th degree of latitude. Mention has been made of the Jews who have settled in India. There are two classes of Jews. There are the white Jews, who have kept themselves pure, and who at this day, though settled as far down in Hindostan as the Deccan, in the 18th degree of latitude, are as fair as the Jews in Palestine. But, then, there are what are called black Jews. These are converts, the descendants of people that have mixed with the lowest classes of the Hindoos, and they are properly speaking of the Hindoo race. There is no such thing as a change of complexion on their part. The white Jews are as white as when they left Palestine, and the black Jews are as black as the rest of the Hindoos, of which stock they are composed. The same may be said of the Portuguese. It is said,—See how black the Portuguese have become in India! Not at all. The Portuguese who have kept themselves pure from Indian admixture are as fair as Portuguese in Portugal. Those who usually go under the name of Portuguese are converted Hindoos with Portuguese names. They are of the lowest castes of Hindoos; and very often they are blacker than the ordinary race of Hindoos. Depend upon it neither the form nor the complexion is changed by climate.

DR. WORTHINGTON.—I beg to say that Mr. Crawfurd is contradicted in that opinion by most of the travellers that I have spoken to on the subject. The Arabs and Jews are justly admitted to be the two nations that never mingle with others. Yet we have black Arabs of the Jordan; and we have black Jews in Hindostan, retaining, in every possible character except the complexion, the Jewish physiognomy; and what is more, retaining records of their race which stamp them to be Jews at the dispersion.

ADDITIONAL NOTICES.

1. *Mémoire sur le Soudan.* Par M. le Comte D'ESCAYRAC DE LAUTURE. Paris, 1855-6.

THE French conquest of Algeria has eminently directed the attention of French geographers to the exploration of the interior of the African continent, and within the last quarter of a century important additions have certainly been made to our knowledge of that widely extended region. The work before us is a résumé of what is known concerning that part of Central Africa between Lake Chád on the west, and Kordofan on the east, comprising a part of Bornu, the territories of Bagharmi, Wadai, and Darfur, and some others of less consideration; it has been mainly extracted from the 'Bulletin de la Société de Géographie.' It is accompanied by a chart, embracing the countries between lat. 6° and 16° N., and long. 13° 20′ and 31° 20′ E., and on which the various routes which have been followed by travellers there are laid down. The same chart includes a portion of the course of the White

Nile, and illustrates to a minor extent the expedition of M. Thibaut up that river (to which journey a short notice following these remarks will be found appropriated).

M. de Lauture informs us at the outset (p. 6), that the Sudan is "not more unhealthy than the French possessions in Africa, that its inhabitants are often found very hospitable, and that it is neither difficult to visit it nor to become acquainted with it." Yet in the same page we are apprised that it is only persons who have become acclimated to tropical regions, and are acquainted with the language, customs, and peculiarities of the nations inhabiting them—and especially of those of Arab descent—who are fitted to become explorers of the Sudan. He afterwards dilates upon the difficulties of obtaining previous information, at all approaching to accuracy, relative to the countries which the explorer proposes to visit. As showing how much necessity there is for the traveller to be on his guard against mendacity on the part of pretended guides, he tells a pleasant story (p. 10) of one of these *savans*, professedly a native of the banks of Lake Chád, who, on being asked the route from Sydney to Peking, declared that he knew both places perfectly well, that the former was situated near his native locality, and the latter twelve days' journey westward, the route between the two passing, amongst other places, through Tripoli!

A sketch is given of the hydrography of the region of the Sudan already indicated, which includes notices of Lake Chád, the river Chari flowing into it from the Lake Koei-dabo, near lat. 7° N., the Lake Debaba in Bagharmi, Lake Fitri, the Batha, or chain of marshes which seems to bound Wadai or Bergou on the south, together with the Keilah and Kouan rivers, which, uniting near Lake Nu (lat. 9½°, long. 29°, *according to the chart*), would appear to connect this system of waters with that of the White Nile. The author next treats of the geographical distribution of the animals and the human races inhabiting this region. In his remarks on the former he states that in the territory watered as above described, an animal with a long moveable horn has been rumoured to exist, which he describes as follows:—"This monoceros, called *ab-garu*, that is 'father,' or 'master of the horn,' carries on the forehead a long and straight horn, either striped like Egyptian alabaster, or black. This horn is moveable on a sort of fleshy and erectile peduncle. The *ab-garu* usually suffers it to fall down in front; he straightens it for combat, and tosses his enemy so as to make the latter fall on a smaller horn situated behind the foregoing" (p. 36). This is doubtless the same animal mentioned by the Baron von Müller in his travels in Africa (Journal of the Royal Geographical Society, vol. xx., part 2, p. 283) under the name of the *anasa*, and reported to him to inhabit the country south of Kordofan. The descriptions of the long and pendulous horn in both accounts are singularly consistent, and if confirmed, the unicorn can no longer be considered a fabulous animal. M. de Lauture observes on the report of the Africans respecting it, "I do not guarantee its veracity, but I incline to the belief that the *ab-garu* really exists." A much less probable rumour is that of the existence of a race of men with tails, who have domesticated a race of camels no larger than asses, and who are said to live west of the lake Koei-dabo. According to our author, however, this legend has currency throughout all the African continent.

In the sections which he has devoted to such meagre portions of the history of Central Africa as he has been able to collect, M. de Lauture gives lists of successive sovereigns of the Fellatahs, of Bornu, Kanem, Mandara, Kotoko, Bagharmi, Fitri, Medogo, Wadai, and Darfur; but it is to be regretted that no corresponding dates can be, or at any rate are, placed against their names, so as to indicate their contemporaries in the history of the civilized world. Lists of itineraries, and accounts of the domestic industry, institutions, dis-

tinctive marks, political intercourse, warlike arts, religion, and superstitions of the nations of the Sudan, occupy the remainder of the treatise, which is worthy of perusal.

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2. *Expédition à la Recherche des Sources du Nil* (1839-40). *Journal de* M. THIBAUT, *publié par les soins de* M. le Comte D'ESCAYRAC de LAUTURE.

THIS is a narrative of a companion of M. d'Arnaud, who, under the auspices of Mehemet Ali, made several expeditions up the White Nile, which he ascended as high as lat. 4° 42′ N. The journal of M. d'Arnaud was published in the 'Bulletin de la Société de Géographie' in 1842. M. Thibaut accompanied that explorer in his first expedition as far up the White Nile as lat. 6° 33′, in the winter of 1839-40.

On their leaving Khartum, Mehemet Ali, the ruler of Egypt, assembled the members of the expedition in the grand divan of the Governor of Nubia, and thus addressed them in giving his parting instructions:—"I do not enter into those countries as a conqueror; be prudent; make presents worthy of me; acquire the good will of the savage people, whom, no doubt, you will meet with in great number; obtain their friendship by benefits. The troops which attend you are only for your protection, and not for attack." This oration, delivered "with that amenity which distinguished him," was truly paternal. It will be hereafter seen how the instructions of the Pasha were carried out. The expedition consisted, besides the special officers, of 400 infantry soldiers, under the command of an adjutant-major and a certain Soliman Cachef, and was conveyed in five gun-boats and five other boats, accompanied by fifteen river transports, carrying provisions for eight months, and munitions of war. It left Khartum on Nov. 16, and in the journal of M. Thibaut, under the date of the 18th, we find the following description:—"The White Nile is not dangerous from sandbanks, as is the Blue Nile; its course is interspersed with numerous islands, which increase in number on proceeding southward. It is of pretty equal depth, but during the season of low water its navigation is difficult, from shell-banks and fallen trees which encumber its bed." The banks on both sides are described as in most parts fertile and well-wooded.

The memoir is unaccompanied by any map. No barometrical, and very few thermometrical observations are recorded; nor are the latitudes and longitudes given of any of the places mentioned. These are disadvantages which very much detract from the value of the narrative as a geographical record. The descriptions of the countries traversed are, however, by no means destitute of interest. On arriving at Lake Nu (which is laid down in the chart attached to the work previously noticed), where several rivers disembogue, the expedition took the wrong track, and ascended a river which was found to be impassable for the flotilla, owing to a vast depth of mud. Ultimately the vessels retraced their course, a distance of 45 miles, and at length rediscovered the main stream of the White Nile, which, above Lake Nu, comes from the south-east.

The Egyptian troops appear soon afterwards, from the details given, to have become ungovernable by their officers; and the latter were imposed upon by a lying or suspicious dragoman. Amongst other exploits, on the 4th of January, whilst in the country of the Kyks, and after a supply of oxen had been afforded to the expedition by the natives, a crowd of the latter assembled on the banks of the river, either attracted by curiosity, or desirous to exchange their weapons and bracelets for glass beads and other ornaments, "when the dragoman, or interpreter, gave notice that the natives opposed the passage.

This, *before it was ascertained to be well founded*, was a signal for massacre. The advanced guard fired; few victims fell, but the people took to flight through the tall grass which concealed them. The soldiery, furious, hastened pell-mell out of the barks; and deaf to recall, pursued the blacks. Some officers followed them, but could not restrain their eagerness. Those of the Sudan were especially violent: many blacks fell before their attack." Again on the 6th, "A hundred blacks, amongst whom were women, showed themselves at a distance watching us; some were dancing, others carried arrows and lances. Our dragoman assured us that they had ill intentions; this was a signal for attack. A sub-officer commanding thirty men ordered them to fire; one black fell, the rest took to flight, and our troops put themselves in line of battle to the sound of the drum. . . . . This expedition was terrible; many of the natives, unable to save themselves, fell victims. A lake into which many of these unfortunates threw themselves was strewn with dead bodies. Our men returned *glorieux!* driving before them some young calves, &c. It was an absurd folly to desire to punish these people, who, doubtless, *had no idea of injuring us. The dragoman had done it all.*" By such manifestations as these, the Egyptians hoped to open a commerce with the interior! Such commerce, however, if it could be established, could not fail to be profitable. In one decayed village the author observed that elephants' teeth were picketed in the ground to form pens for cattle, and had been used in the construction of cabins and outhouses.

The expedition arrived at Khartum, on its return, March 29, 1840, after an absence of four months and a half. On the 26th of January the boats had reached a point beyond which the diminished depth of water at that season would not permit them to advance. M. Thibaut records at full length a speech of his own (p. 81) in a council of deliberation held on the subject, which he says materially influenced the decision for an immediate return.

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3. *Biblical Researches in Palestine and the adjacent Regions: a Journal of Travels in the Years* 1838 *and* 1852. By EDWARD ROBINSON, ELI SMITH, and others. Drawn up by Professor E. ROBINSON, D.D., Gold Medallist R.G.S., etc. Second edition, with new Maps and Plans. Murray.

FOUR handsome volumes, under the above title, have recently been added to the library of the Society. The former edition, for which it will be recollected the Society awarded to its author a gold medal in 1842, was in three volumes. These, as Professor Robinson announces, have in the present edition been compressed into two volumes, partly by a change of type and partly by the omission of portions of the former appendix and notes, whilst the text remains for the most part unchanged. The third volume of the present edition consists of the additional researches of the author and his fellow-travellers in the same region in 1852; and the fourth of the volumes, to which we have alluded, is merely a duplicate of the third in the second edition, and is published in a separate form, to render complete the series belonging to the possessors of the first edition.

The journeys of Professor Robinson, as detailed in the volumes published in 1841, were first through central Europe to portions of Greece and Egypt—then from Cairo to Suez—to Mount Sinai—to Akabah—to Jerusalem and through its neighbourhood, after descriptions of the topography, antiquities, history, statistics, &c., of that city—from Jerusalem (N.) to Bethel—to 'Ain Jidy, the Dead Sea, Jordan, &c.—from Jerusalem (S.W. and S.) to Gaza and Hebron—from Hebron (S.S.E.) to Wady Musa and Petra—from Hebron to Ramleh and

Jerusalem—then to Nazareth and Mount Tabor—by the Lake of Tiberias (N.) to Safed—from Safed (N.W. and N.) by Tyre and Sidon to Beirut—and thence homeward by way of Smyrna, Alexandria, Constantinople, and Vienna.

In his preface to the present edition Professor Robinson states: "The corrections and additions to the original work are few, but not unimportant. Notes have been added at the end of vol. 1 on the position of Israel at Sinai, on Jebel Serbâl, and on the Sinaitic inscriptions. Ancient *Geba* is now identified with Jeba'; *Gibeah* of Benjamin is recognised at Tuleil-el-Fûl; while *Ophrah*, *Ephron*, and *Ephraim*, as being probably one and the same, are fixed at Tayibeh. The historical evidence is also given of the identity of *Eleutheropolis* with Beit-Jibrin; and a new marginal note enumerates the reasons for not seeking *Kadesh-barnea* in the high western desert." With this information, then, may be dismissed in this place the first two volumes of the new edition, which, as the author with just gratification and absolute truth remarks, "have been permitted to take rank as a standard work in relation to the Holy Land."

Of the contents of the third volume, an abstract appears in the twenty-fourth volume of our Journal (1854), accompanied by a map, upon which the route travelled over is very distinctly laid down. This is a great advantage in maps and plans intended to indicate the proceedings of travellers. The maps belonging to the present edition of Professor Robinson's work are by Kiepert, of Berlin. Although most elaborately drawn and beautifully executed, especially as regards the physical geography, they are somewhat too crowded to exhibit clearly on their comparatively limited scale the names of places and the route which the author pursued. Starting from Beirut, where his previous researches had terminated, Professor Robinson in this, his second tour, went southward along the coast to Sidon; thence, striking inland through Galilee to 'Akka (Acre), he visited in this route Tibnin, Rameh, Meiron, &c., at all of which places striking remains of antiquity are to be found. Of 'Akka the author gives an extended description and historical notice. Thence he continued, still for the most part southward, through Galilee and Samaria to Jerusalem, by way of Kana (Cana of Galilee), Seffurieh, across the Plain of Esdraelon, and along the eastern side of Mount Carmel, to Nabulus (Nablous). In this part of his work some curious details respecting the Samaritan population and their ancient books are added to what the author had stated in a previous volume. Lydda, Yalo (Ajalon), and 'Amwas (Emmaus), lay in this portion of the journey. More than a hundred pages are occupied with highly interesting observations made at Jerusalem, in the course of which many important points in topography and archæology are determined, or brought under review. From the Holy City excursions were made on the west and south; in the latter direction as far as Hebron. Leaving Jerusalem on the north for Beisan (Bethshean, or *Scythopolis*), the travellers took in their way Akrabeh, Nabulus a second time, Tubas (the *Thebez* of Scripture), a portion of the "Ghor," or valley of the Jordan, and Sakut, which, in the opinion of Professor Robinson, after a consideration of various authorities, "represents the name and site of the ancient Succoth." Before reaching Beisan the party forded the Jordan, in order to visit on its east side the ruin ed-Deir, probably the *Jabeth-Gilead* of Scripture, and also Fahil, which the writer has been the first to identify by observation * with Pella, whither the Christians of Jerusalem withdrew previous to the destruction of that city by Titus.

* Professor Robinson states (iii. 323) that Irby and Mangles were the discoverers of the ruins here, but that no Frank traveller had since visited the spot. Kiepert had already proposed to insert the name Pella in the maps, before the second journey of our author. The latter adds, "It was not done, however; because I desired that the maps should contain nothing which had not been actually verified: but in Kiepert's own later map, published in 1842, Pella was thus inserted for the first time, with a query."

"Scythopolis must have been a city of temples." The traces of several, of an amphitheatre built of black stones, a fine Roman arch thrown over the chasm of the Jâlûd, and remains of thick walls here, are described by Professor Robinson, who also gives a sketch of the history of the city from the period when the bodies of Saul and his three sons, slain on the adjacent mountains of Gilboa, were fastened by the Philistines on its wall (1 Samuel, xxxi. 10; 2 Samuel, xxi. 12). From Beisan the researches were continued northward through Galilee, and to Hasbeiya near the head-streams of the river Jordan. In the course of this journey Mount Tabor was passed on its eastern, and the Lakes of Tiberias and Huleh on their western sides. Irbid, the *Arbela* of Josephus, where are some remarkable caverns, Tell-Khuraibeh, which our author regards as the Hazor taken by Tiglath-Pileser, and Kedes (*Kedesh*), lay in this part of the route. 'But by far the most interesting portion of this section is the identification of the sites of Capernaum, Bethsaida, and Chorazin on the western shore of the Lake of Tiberias, which Professor Robinson, after a comparison of the statements of authorities, from the seventh to the seventeenth centuries of our era, aided by his own inspection of the localities, considers that he has satisfactorily made out (pp. 347–361).

The ninth of the sections, into which the volume is subdivided, embraces a circuitous tour from Hasbeiya to Banias (*Paneas*) and back again, partly on the eastern side of the head-streams of the Jordan, and extending southward nearly to Lake Huleh. In the course of this journey Khiyam, Tell-el-Kady, the ancient city of Dan, the lake Phiala, the sources of the Jordan, and Hibbariyeh, where is a fine ruin of an ancient temple, were progressively visited. From this point (Hasbeiya) the researches extend into a region entirely untrodden in the journeys to which the previous volumes before us have reference. The travellers went eastward, across Mount Hermon, to Damascus, "the oldest city in the world." Throughout all this route the remains of antiquity are numerous: many of these are described, and to Damascus and its history twenty-five pages are allotted. After excursions in the neighbourhood of this city, we find Professor Robinson and his companions, having recrossed Anti-Libanus, proceeding northward to Ba'albek; in the course of which journey records are made of Roman inscriptions and sepulchres in the valley of the Barada, of the remains of Abila, Mejdel with an ancient temple, and 'Anjar (probably the *Chalcis* under Lebanon). To Ba'albek, which has been repeatedly described in the books of other travellers, considerable space is devoted, accompanied by some plans of its vast and interesting temples, which have been so singularly passed over in the narrations of ancient writers. From Ba'albek the route of Dr. Robinson and his fellow-travellers extended through the Buka'a, or Cœlo-Syria, as far as El Husn, passing in the way er Rás (probably the ancient *Conna*), the head-streams of the Orontes, and Ribleh (the *Riblah* of Scripture). Incidentally to the details of this journey, geographical remarks on Lebanon and Anti-Lebanon, and notices of some places not visited, as Apamea, Larissa, Hamath (Hamah), Arethusa, Emesa (Hums), and Laodicea of Syria, are appended. Finally, in the circuitous route south-westward, taken again to Beirut, the great convent Mar Jirjis (St. George), el-Humeira, with its intermitting fountain, the subject of a curious legend (pp. 572-3); 'Arka, an ancient Phœnician city; the remains of the temple of Afka (*Apheca*), with the sources of the river Adonis; the large temple at Fukra; the pass of Nahr-el-Kelb (ancient *Lycus*), where is a curious collection of Egyptian and Assyrian antiquities, side by side; and the cedars of Lebanon receive notice. We greatly regret that we cannot find space for the description of the last named, of which an account will be found at pp. 588–594.

For some detached particulars scattered through the third volume, however, room must be spared. We learn, at p. 32, that "the Turkish government has wisely continued and extended the system of posts introduced into Syria during

the Egyptian dominion. At present (1852) a post travels every week to and fro between Beirut and Jerusalem, by way of Yâfa; another passes northwards weekly to Tripoli and Lâdakiyeh, and thence to Aleppo. The communication with Damascus (from Beirut) is twice a week. From Aleppo and Aintab a land post goes regularly through Asia Minor, both to Constantinople and Smyrna. The transmission of letters on all these routes is tolerably rapid, and not expensive." At Beirut there existed in the same year a *native* "Society of Arts and Sciences," which had been founded in 1847, a part of its members having been educated in the American mission at that town. The Society met twice in a month, when papers were read, questions discussed, and occasionally lectures delivered; and in the first year of its existence 750 volumes had been collected for a library, amongst which were 527 Arabic and Turkish manuscripts, some of them dating back seven or eight centuries. Professor Robinson attended some of the meetings, and remarks, "With one exception the speakers were *all natives*, and I have heard much worse speaking before Literary Societies in London and New York" (p. 27). Such a circumstance is one of better omen for the progressive advancement of the countries under Turkish rule, than any mere political events could afford.

In reference to Lejjún, the ancient *Legio*, the author reminds the reader that in a former volume he had set forth the grounds for assuming the identity of Legio with the more ancient *Megiddo* of the Old Testament. He adds, "Our visit only strengthened this conviction" (p. 118). In his criticism relative to the rock-hewn tomb beneath the church of the Holy Sepulchre at Jerusalem, Professor Robinson gives his reasons for not referring its formation to even so early an age as that of Constantine—and, in fact, all his researches in that city attest the difficulty of identifying the correctness of sites to which specific names have been applied in accordance with monkish traditions. With respect to the antiquity of the arch in masonry, he asserts that "it was well known in the East long before the period of the Jewish exile, and at least seven or eight centuries before the time of Herod" (p. 229).

At Urtas, near Hebron, the author fell in with seven or eight Americans, men and women, who had come out as missionaries to introduce agriculture among the Jews, but being unacquainted with the language and customs of the country, and therefore helpless, they had been taken by Meshullam, a convert from Judaism, into his employ, where they found at least food and shelter. They had brought out with them some American ploughs, but could make no use of them for want of stronger teams. A similar colony of Germans had been in like manner employed by Meshullam two years before, but they, too, had become dissatisfied, and dispersed (p. 274). Professor Robinson says, "It is hardly necessary to remark that the idea of speedily converting the Jews, living as strangers in Palestine, into an agricultural people, is altogether visionary." Mere enthusiasm in any object, unsupported by sufficient knowledge to enable its being properly carried out, can be expected to result in nothing but lamentable failure.

In recording the arrangements made by himself and his companions previous to entering upon their tour, Dr. Robinson remarks (p. 31), "that the most usual mode of travelling in Syria is for a party to put themselves under the charge of a dragoman—a native who speaks more or less of English, French, or Italian—and who undertakes to provide them with sustenance, servants, tents, bedding, and means of transit." The party found the expenses of travelling comparatively less on this journey than on the preceding one under the Egyptian rule; they amounted to somewhat less than 1*l.* each daily. It is stated that the travellers took with them no weapons whatever, and never for a moment felt the need of any. Each had a Schmalkalder's compass, measuring tapes, and thermometers. Besides the books enumerated in his former work, Professor Robinson took with him the first two parts of Ritter's great work on Palestine, the sheets of the

third part as far as to the description of 'Akka, and the latest and best maps of the region, including the large route map of the Dead Sea expedition. At the commencement of his third volume he gives us a very complete list of standard or popular works on Palestine, Jerusalem, &c., with highly useful remarks on their comparative trustworthiness and value.

As a dedication, although placed at the commencement of a book, is commonly the portion of it which is the last to be penned, it is quite legitimate for a commentator, like an author, to postpone its consideration to the end of his labours. A name may be inscribed on the front page of a work as a matter of form, or in deference to some exalted personage; but it is more appropriately that of an authority from whose learning, researches, or other aid, the author has derived signal advantage. The first two volumes of the present edition were originally inscribed to Lord Prudhoe, whose investigations, carried on in Egypt and the adjacent countries to which those volumes relate, prove that his Lordship is entitled to such a recognition not solely on account of his distinguished rank. The third volume has been dedicated by Professor Robinson "To William Martin Leake, Esq., the model traveller." Assuredly the acuteness, care, and learning displayed by Col. Leake, in his published works on classic regions, could not fail to be recognised by a practical investigator of the stamp of Professor Robinson, who has thus worthily testified his admiration of the abilities and acquirements of our learned *confrère*; and the testimony accorded by this dedication is honourable alike to the discrimination of him who gives it, and to him by whom it is received.

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4. *Hutchinson's Western Africa.* Longman and Co., 1858.

MR. HUTCHINSON has resided for eight years in Western Africa, and was the officer in medical charge of the *Pleiad's* crew during Dr. Baikie's expedition up the Tsadda in 1854. During the last two years he has occupied his present position of British Consul for the Bight of Biafra and Fernando Po, in which districts his acquaintance with the African coast first commenced.

The former part of his volume is occupied with cursory remarks on the numerous settlements in West Africa, from Portandick down to Palma, but more copious information is afforded as to the scenes of his present duties. The chapters on Fernando Po will be of great interest to those who shared in the opinion entertained by the late Sir T. F. Buxton and others, that the geographical position of this lofty island marked it out as a most important station whence European influence might act upon the civilization of Western Africa. The account given by Mr. Hutchinson of the whole history of our connection with this island is the only one that has yet been published, so far as the writer of the present notice is aware, and it is to the following effect.

Fernando Po was discovered by the Portuguese in 1471, ceded, for some equivalent, to Spain in 1778, together with the neighbouring island of Anno Bon, and in the same year taken possession of by her by means of a large expedition which contained 150 intended settlers. But the fate of this expedition was disastrous: the old Portuguese settlers at Anno Bon considered the new comers as intruders, and resisted and repulsed them. They then settled at Fernando Po, but in three years the climate had carried off 128 out of the 150, and the survivors were then recalled to Spain, and from that date until 1843 "the Spanish Government seems to have blotted Fernando Po out of their maps."

In 1827 the English Government was induced to establish a colony on this island. The settlement was commenced by Captain Owen. The ground was formally taken possession of in the presence and with the permission of two

native chiefs, from whom it was bought for a trifle, and Europeans were forthwith set to work, in the blazing sun, to dig and clear the ground and to raise mounds for guns. A fearful mortality ensued, which would not have been the case had Krumen been employed, whose services are always easily to be obtained, and the settlement prospered poorly. Into the causes of its ill success Mr. Hutchinson does not enter.

In 1833 Admiral Warren came out in the *Iris*, and disclaimed, on the part of the Government, their intention of keeping up the settlement any longer.

From 1833 to 1837 the island remained in the hands of a private company, Dillon, Tennant, and Co., on whose failure in 1837 the West African Company became possessors of the stores, and they sold them to the Baptist Missionary Society in 1841 for 1500*l*.

In 1843 Spain resumed possession; the Spanish flag was hoisted there, as well as at Corisco and Anno Bon, and Mr. Beecroft was made Spanish governor of these three islands. In 1845 another expedition was sent, which left behind two priests and a few soldiers: the soldiers soon died, and the priests left the island.

In the meantime the British Government, recognising the importance of its commercial interests in the Bights of Benin and Biafra, established a consulate, and Mr. Beecroft was appointed consul. His situation as Spanish governor did not interfere with this, as it was a mere nominal title, without any Spanish interests whatever for him to superintend; and at the death of Mr. Beecroft in 1854, he was succeeded by Governor Lynslager, a Dane.

At the time of the arrival of a body of Spanish missionaries in 1856 not a single Spaniard was resident in the island.

Since the foundation of Clarence, British cruisers have landed negroes from many captured slavers, and in March, 1856, the census of the population was as follows:—

Englishmen	7
Other British residents	98
Liberated negroes	238
Children of old settlers, and others who consider themselves British subjects ..	222
Other negroes, working as artisans and servants	416
Total	981

Fernando Po, though rising to 10,000 feet above the sea, is wooded to its very summit, and teems with indigenous products, but it is uninhabited except to a very low level. Mr. Hutchinson corroborates the opinion of Lander that Clarence is not the best place for a settlement, but that St. George's Bay offers a much better harbour, and that the high land on the top, Cape Badgely, would be as healthy for an European settlement as any place in a tropical island can be, since it is probably above the fever level and is fully exposed to the westerly breeze.

There has always been a difficulty about the ethnological group to which the natives of Fernando Po belong. Mr. Hutchinson describes them as perfect negroes, and decidedly without any of those Caucasian features ascribed to the Guanches, the indigenous population of the Canaries. He finds especial fault with the two likenesses of Fernandians published in Lieutenant-Colonel Smith's work on the Natural History of the Human Species. They are utterly unlike Fernandians, either in colour or in form of feature. A long list of their ceremonies is given with a view to their identification with other tribes. Their burials are very peculiar, for their dead are buried upright, with the

bodies half out of the ground, and the family emigrates to another town. Their fetish is a snake.

Considerable space is devoted to the preventives and treatment of African fever. Mr. Hutchinson especially insists on flannel next the skin, quinine in small daily doses to keep off the fever, and, in river expeditions, avoidance of stowage of green wood in the bunkers. A recommendation of Admiral Bruce, some years since, is published as thoroughly falling in with his views, viz., that a regulation ought to be established, by which the masters of merchant-vessels anchored for the purposes of trade up the African rivers should, during the first month after crossing the bar, serve out quinine wine to their crews in the place of lime-juice, which is in no way needed on account of the super-abundance of vegetable produce.

As regards the development of commerce in Africa, he considers that Lagos cannot ever become an exporting place of importance on account of its dangerous bar and fearful surf,—impediments which are absent at the mouths of the Niger (Nun), Bonny, Old Calabar, and Cameroons Rivers.—F. G.

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5. *Report of the Ordnance Survey of the United Kingdom.* Ordered by the House of Commons to be printed, 30th June, 1857.

THIS Report of Lieutenant-Colonel James, R.E., F.R.G.S., contains in a few pages a very complete and interesting account of the way in which the maps of the Ordnance Survey are drawn, reduced, and engraved at head-quarters in Southampton.

The Report refers to the state of the arrangements last year, immediately preceding a vote in the House of Commons, on the motion of Sir D. Norreys, by which a reduction was ordered in the scale upon which the survey of the country was then being carried on, and consequently a part of Colonel James's contrivances fell into disuse.

At that date the Ordnance Survey was occupied, 1st. In making a survey and a MS. plan of all England and Scotland, excepting only the uncultivated districts, on the scale of 25 inches to a mile (or, what is very nearly the same thing, a square inch to an acre).

2ndly. In reducing these to a scale of 6 inches to a mile, and engraving and publishing them, and likewise in surveying, publishing, and engraving the uncultivated districts to the same 6-inch scale.

3rdly. In making a further reduction of the above to a scale of 1 inch to the mile, in order to complete as rapidly as possible the still unfinished general map of Great Britain.

Lieutenant-Colonel James's Report shows the contrivances adopted by him to economise labour in all these steps, and 28 pages are devoted to illustrate the effects of his contrivances.

In drawing the original plans, stamps and stencil plates are used for the figures, letters, trees, and various kinds of shading; and in engraving the 6-inch scale plates, punches are used for the same purposes, and mechanical means are adopted to give the shading. Evenness of work is thus obtained, together with a great economy of skilled labour, while the examples adduced are in no way to be charged with stiffness of execution. For publishing copies of the large-scale plans, zincography is used: it was found far more convenient than lithography; the prints were equally sharp, and decidedly darker. When the necessary copies had been printed off, and the plate had been recleaned, it was always possible, at any future time, to form a fresh zincograph from one of the old impressions by using the anastatic process. Examples of all these are given; and the cost of these publications is so small, that a copy of the MS.

plan or of a printed one may be transferred to the zinc, and 50 impressions taken off for 50 shillings.

It was a matter of great importance to find a ready way of reducing drawings from a larger scale to a smaller one, and after many experiments photography was found to fully supply the requirements of the office. By its means, and without sensible distortion, one man is literally able to do the work of 100 skilled draughtsmen; thus, a single individual, with the aid of a printer and a labourer, produced in 6 days 12 square feet of photographic reductions, besides 135 impressions in all from photographic positives that had already been prepared. One of these reductions is given to the engraver to work from, another to the officer who inserts the contours, and so on, and by this arrangement everything proceeds *pari passu*.

Experiments were made to ascertain the relative powers of the different colours for producing photographic tints, and the following scale of colours was found to produce a scale of shades from nearly perfect white to jet black: *blue*, *purple*, *red*, *orange*, *yellow*. All the streets and houses in the plans are coloured yellow, and appear as jet black in the reductions. The hill shading on the 6-inch maps is similarly done with bold yellow strokes, the artist guiding his touch by the fine contour lines or the levels which are engraved upon them. When these are reduced to the 1-inch scale, the contour lines, &c.,' become quite invisible, and the hill shading stands out in dark relief. Most beautiful specimens are given of these photographic reductions.

Lastly. When the plates have been engraved it is found expedient never to use them for printing, but to keep them as permanent references, and to prepare any required number of electrotype duplicates from them. This art of electrotyping is here carried on, as Colonel James considers it, to perfection. There is no loss of sharpness in the duplicates, additions and alterations can be made without tampering with the original plate, and there is no fear of a gradual deterioration in future impressions.

The effect of the vote of the House of Commons, June, 1857, has been to cause the discontinuance of the surveys on the large scale, and at present the rural districts are being surveyed and drawn on the same 6-inch scale on which they are engraved, and afterwards they are reduced by photography and engraved on the 1-inch scale.—F. G.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1858.

Thirteenth Meeting (ANNIVERSARY), 1 P.M., *May 24th*, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

THE Minutes of the previous Meeting having been read and confirmed, the regulations respecting the Anniversary Meetings were next read, when the President appointed William Bollaert and John Brown, Esqrs., Scrutineers for the Ballot.

The Rev. H. Lewis, T. J. De Bourgho, Edward David Ogilvie, William Nicholas Reed, Samuel Leigh Sotheby, and William Reynolds Vines, Esqrs., were proposed as Candidates for election at the next Meeting.

The Report of the Council, with the Balance Sheet for 1857 and the Estimate for 1858, was then read and adopted.

The President next delivered the Patron's or Victoria Gold Medal to His Excellency the Hon. G. M. Dallas, the American Minister, on behalf of Professor Alexander Dallas Bache, Superintendent of the United States Coast Survey, for his extensive surveys of America, and for the additions made by him to our knowledge of Geography and Hydrography.

The Founder's Gold Medal was delivered to Captain Richard Collinson, R.N., C.B., for his discoveries in the Arctic Regions, and for having, in H. M. S. *Enterprise*, penetrated farther to the Eastward, through Behring Strait, than had been reached by any other vessel.

The President then read his Anniversary Address, for which a unanimous Vote of Thanks was passed, with a request that he would allow it to be printed.

The Ballot being concluded, the Scrutineers reported that the changes advised by the Council had been adopted. The vacancy among the Vice-Presidents, occasioned by the retirement of Sir Walter C. Trevelyan, Bart., to be supplied by Captain Richard

Collinson, R.N.; that among the Trustees caused by the resignation of W. R. Hamilton, Esq., to be occupied by Richard Monckton Milnes, Esq., M.P.; and those in the Ordinary Councillors, produced by the retirement of the Rt. Hon. W. E. Cardwell, M.P.; Capt. R. Collinson, R.N.; R. Monckton Milnes, Esq., M.P.; Lieut.-General Sir G. Pollock, G.C.B.; Henry Raper, Esq., R.N.; Capt. J. Lort Stokes, R.N.; and Sir Harry C. Verney, Bart., M.P.; to be filled by Lord Dufferin; W. J. Hamilton, Esq.; Lieut.-Colonel H. James, R.E.; Capt. the Hon. H. A. Murray, R.N.; the Earl of Sheffield; Colonel Thomas M. Steele, and Robert Stephenson, Esq., M.P.

Thanks having been voted to the President, Vice-Presidents, Members of the Council, Auditors, and Scrutineers, the President finally directed attention to the usual Anniversary Dinner, and the Meeting adjourned at 4 P.M.

PRESENTATION

OF THE

ROYAL AWARDS

TO

PROFESSOR ALEXANDER DALLAS BACHE, OF THE UNITED STATES; AND CAPTAIN COLLINSON, R.N., THE ARCTIC EXPLORER.

THE President read the following statements explanatory of the grounds on which the Council had awarded the Royal Medals respectively:—

The Victoria or Patron's Medal has been adjudicated to Professor Alexander Dallas Bache for his successful labours in carrying out the Great Coast Survey of the United States of America. This noble work owes its origin, we believe, to the suggestion of those enlightened statesmen Jefferson and Gallatin, as early as 1807, and was supported in 1809 by the American Philosophical Society, when Mr. Hassler, an eminent geometer of Switzerland, then resident in the United States, was entrusted with its execution. But war, and the time required for the manufacture of the instruments, delayed the commencement of the work till 1816. Continuing the Survey, with a brief interruption, to 1844, Mr. Hassler was then succeeded by our Medallist.

Operations of this nature will, of course, have been made available for a correct delineation of all the surface of the interior; for it is manifest that every triangle referable to a known unit furnishes three decided bases with which others may be connected in any direction, as long as there remains a *terra firma* for the instruments to stand on; but these internal operations being more of a domestic nature, do not appear to the Council to establish any distinct claim to the Medal. The case, however, is very different when we come to consider the accurate delineation of such a coast as that of the United States, commencing at the State of Maine, comprising no less than eighteen states on the Atlantic and Gulf of Mexico,

besides others on the Pacific, and extending, as we are credibly informed, over not less than 30,000 miles. This number, no doubt, includes all the windings and indentations of the coast, and the interiors of its harbours, the islands, &c.; for it is to be remarked that, by the especial provision of the Government of America, the duty is not confined to one class of persons, but is shared equally by military and naval men and civilians, all chosen for their fitness, whereby not only is the field for selection vastly expanded, but a greater facility of correctly taking soundings and delineating shoals, harbours, and isolated rocks, is afforded.

It would be impossible to do justice to an extensive work of this sort on an occasion like the present; but as the previous Reports of this celebrated Coast Survey from 1844 to 1855, inclusive, are in our Library, those of our Associates, and of the public generally, who wish to form an estimate of their value, can do so at their leisure, and they will see how vastly our Medallist has pushed on this great work. They will assuredly then rise from the examination with the thorough conviction that, whether we regard the science, skill, and zeal of the operators, the perfection of their instruments, the able manner in which the superintendent has enlisted all modern improvements into his service, the care taken to have the observations accurately registered, his modest and unpretending demeanour, or the noble liberality of the Government, tempered with prudent economy, all unprejudiced persons must agree that the Trigonometrical Survey of the United States of America stands without a superior.

What then are we to say respecting the accurate delineation of this immense tract of coast, so much frequented by commerce, so important in every point of view to mankind at large, but that it is a great and universal boon conferred on all the inhabitants of this globe? We all benefit by the security of navigation; it is not the Government of the United States of America alone which derives an exclusive advantage from this admirable series of operations, but those who have most frequent access to the shores of the Atlantic and Pacific chiefly participate therein; and as Great Britain stands foremost amongst these, on whom can we so deservedly bestow one of our two Royal Gold Medals this year?

The President then addressed his Excellency the American Minister in these words:—

"Mr. Dallas,—Whilst I can truly say that the Council and myself rejoice in this opportunity of recording our sense of the high merits

of Professor Bache, I have a peculiar satisfaction in being permitted to place the Victoria Medal of the Royal Geographical Society in the hands of your Excellency, with the request that you will convey it to your eminent relative.

"The grounds for making the award of the highest distinction which it is in our power to confer, have been expressed in the terms sanctioned by the Council; but that document does not allude to other great qualities of a man who, besides his admirable Coast Survey, has so largely extended our knowledge on various subjects of scientific importance. I may here cite his delineation of the iso-magnetic curves both in Europe and America, his littoral and deep-sea soundings, which, it is believed, will soon enable us to read off the natural history of the Gulf Stream, and to calculate the periodicity and perturbations of the tides at given spots, and his many ingenious inventions, including a method of registering the pulsations of distant earthquakes.

"British philosophers, Sir, have indeed long admired the progress of your accomplished relative, as I can personally testify; for when he visited our country, in 1847, I had the gratification, on resigning the chair of the British Association to my esteemed friend Sir Robert Inglis, to welcome Mr. Bache to our meeting at Oxford, where he presented to us some results of his great Survey, and we did honour to ourselves by enrolling him among our honorary members.

"Lastly, Sir, when I know how successfully he has recently been labouring to aid the accomplishment of the submarine electric telegraph which is to unite our countries—that this same individual is the great-grandson of the illustrious Benjamin Franklin, as well as the near relative of one of your leading statesmen, and that, bearing his honoured name, he is your own nephew, I feel, in common with my Associates, that there never was an occasion on which the sympathies and just pride of our kindred nations were more thoroughly united, than they are by the adjudication of the Victoria Gold Medal to Alexander Dallas Bache."

The American Minister thus replied:—

"Mr. President,—I receive with much gratification, on behalf of my eminent fellow-citizen, Professor Alexander D. Bache, this mark of the approbation of your learned Society.

"The fame of her sons in the noble brotherhood of science is a most cherished part of my country's wealth and strength; and, as her national representative, I thank you, Gentlemen, for thus adding to her store.

"Professor Bache has for many years discharged elevated, interesting, and arduous duties under the Government of the United States. He was specially fitted for these by academical training and successes, by educational labours, by an intellect at once lucid, profound, and persevering, and by an aptitude, not too common with reserved students and philosophers, for practical method and administration. Without adverting to a rich series of prior and of

accessory performances, I speak with entire certainty in saying that his chief work (though yet uncompleted), the Survey of the American Coasts, Sounds, and Estuaries, in all their expansion, intricacies, and characteristics, admirably delineated, as if daguerreotyped, in charts of extraordinary perfection, has earned for him a solid and enduring reputation in this, as in our own, hemisphere.

"I believe him, Sir, in every respect entitled to the high honour you confer by awarding this Medal, and am happy in being made by your distinguished Association the medium of its safe transmission."

The Founder's or King William's Medal has been decerned to Captain Richard Collinson, R.N., C.B., &c., &c., for having in Her Majesty's ship *Enterprise*, though baffled by provoking calms and adverse winds, ultimately passed through Behring Straits in search of Sir John Franklin and his companions. Hampered by those glacial obstructions which every change of wind wafted against him, and greatly perplexed by the proofs occasionally found of his former companion, M'Clure, being in advance, but without the slightest intimation of the course he had pursued, Captain Collinson deemed it advisable to follow the open water in shore, and thus penetrated farther to the eastward than any vessel had ever reached, approaching nearly to the point attained by the *Hekla* from the Atlantic in 1819.

Though employed on a mission of pure humanity, Captain Collinson was quite alive to the benefit commerce might derive from taking advantage of the now discovered resort of shoals of huge whales, seen from time to time disporting themselves in unvisited security; and, therefore, this voyage has also the merit of extending the field of that profitable fishery in the Arctic Seas.

Captain Collinson's previous services as a surveyor (and he was with our late lamented President Admiral Beechey) in different latitudes, but more particularly on the coast of China—at Canton, Golongsoo, and especially when he surveyed the channel before Woosung, and surmounted all the difficulties in the navigation of the Yang-tse-kiang, during the advance of the British on the city of Chin-kiang-foo, are to be found in the Gazette of 1841 and 1842. His accurate description of his track left nothing to be desired.

Captain Collinson's astronomical observations, together with his contributions to the geography of Arctic America, have already appeared in the Society's Journal, vol. xxv., and are highly appreciated for having corroborated and given a more fixed character to our knowledge of those regions.

While carried forward by his great zeal and courage, and far

beyond any of his predecessors—no ship having been there before —it must also be remembered that this officer exhibited peculiar skill and prudence in the selection of his route, in overcoming great impediments and the opposing current, and, lastly, in re-conducting his ship from that dreary solitude and monotonous waste of waters in safety to his own country.

A detailed list of his geographical positions has been printed in the Journal, and a synopsis of his meteorological, tidal, and other scientific observations has been deposited with the Society.

The President then addressed the recipient of the Founder's Medal in these terms:—

"Captain Collinson,—As a friend of Franklin of thirty-five years' standing, and as one who has had his heart set upon never ceasing to search the Arctic regions until we obtained true tidings of the fate of that great explorer and his gallant companions, I enjoyed the sincerest gratification when our Founder's Medal was unanimously voted to you at a full Council where you only (at my own request) were absent.

"Gratified as I have invariably been in seeing all our Arctic explorers rewarded, it truly gladdens me to have your name added to the list of those noble British seamen who have received our highest distinction for their meritorious services, whether in the cause of Arctic geographical discovery or in the subsequent searches after Franklin.

"When we know how perseveringly you endeavoured to realise a north-eastern passage from Behring Straits, by carrying your sailing ship, the *Enterprise*, to a more northern latitude in that meridian than any British seaman had attained, and that, trending a large part of the north coast of America, you pushed your vessel up the eastern side of Banks Land to nearly the same point as your eminent brother medallist M'Clure, and that when foiled by the great packs of ice you retraced your steps, and, nothing disheartened, still threaded your way eastward along the mainland until you reached the open sea between Victoria Land and King William Island, whence you brought back your ship to England, I have strong grounds for saying, that we mete out but simple justice in granting to you this distinction.

"There is yet, Sir, another reason which operates strongly in satisfying me that you are well worthy of this or any honour which may be conferred on you. You warmly advocated the last search after Franklin; and if your judicious suggestion had been complied with, of sending once more a vessel by Behring Straits to the spot whither you went and whence you returned, and on the successful repetition of which you staked your well-earned reputation, we should now feel no anxiety respecting the isolated efforts of M'Clintock; whilst, to the eternal credit of our country, the problem of the fate of Franklin would in all probability have been for ever solved.

'" For all these reasons, and also because, though not chosen to perform any part of the noble mission on which your mind was bent, you have earnestly laboured in carrying out the last Franklin Fund Subscription in aid of the survey undertaken by your younger brother officer M'Clintock, I have the sincerest pleasure in putting this Medal into your hand."

Captain Collinson then replied:—

" Mr. President,—I must ever retain a lively recollection of the kind and impressive manner with which you have conveyed this honour—an honour which is greatly enhanced in my estimation by its having come through the hands of one who not only holds so eminent a position in the scientific world, but who has taken so deep and unswerving an interest in that great cause which has led to its bestowal. I receive it, Sir, as the tribute which Knowledge pays to Enterprise. Hand in hand the two sisters have worked together, the one, by laborious study and close reasoning, pointing out the path which the other, firmly relying on the matured judgment of her elder sister, has unhesitatingly followed, until, in this our day, we have seen the Himalayas mapped, a great portion of the interior of Australia explored, an Antarctic continent discovered, the water boundary to America established, and last, but not least, Africa permeated.

" These results have to a great extent exhausted the field of exploration, but a higher and a nobler task awaits their efforts; we have to turn them to good account; and whether we go forth as settlers to occupy, or as merchants to exchange our manufactures for the natural productions of these distant regions, we have to diffuse among their inhabitants the comforts of civilization, the advantages of free institutions, with the blessing of that true and holy religion under the special providence of which we have spread from an insular kingdom to a mighty empire.

" Though these things are rapidly coming to pass, we cannot expect to see them fully realised; after ages will, however, acknowledge with gratitude the furtherance which they have received from the influence of this Society—a Society through whose annals the public is made acquainted with the progress of discovery, where the field of ambition is opened to the young geographer, who is shown the best means of accomplishing his object, and where (but with diffidence I now say it) a generous stimulus is given to scientific research and to perseverance under difficulty, by the distribution of honourable distinctions, such as it is my good fortune to have been deemed worthy of deserving.

" I have to thank you, Gentlemen, for the kind reception you have given to the award of the President and Council. Your cordiality has afforded me a life-long gratification; it sends me to my seat with the assurance that on this occasion I may assume the motto of that illustrious seaman who made the signal 'England expects every man to do his duty'—'Palmam qui meruit ferat.'"

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 24th May, 1858,

By Sir Roderick Impey Murchison,
G.C.St.S., D.C.L., M.A., F.R.S., &c.,
PRESIDENT.

Gentlemen,—At the last Anniversary it was my mournful task to advert to the great losses we had sustained by the decease of my two predecessors as well as of several other geographers of distinction. Although on this occasion the hand of death has not fallen so heavily upon our leaders, we have still to lament that some of our most distinguished associates have been taken from us. At the head of this list I unquestionably place the name of one who, after a long and well-spent life, has passed away in the ripeness of age, having won for himself the admiration of all those who knew him during the last half century. That man was Rear-Admiral Sir Francis Beaufort, who, whether we look to the bravery, zeal, and talent he displayed in his earlier days as a naval officer afloat (one whom every sailor would have followed to the death), or to his maturer years when he shone as the bright scientific light of the British Admiralty, has his memory embalmed in our love and respect.

I will not now attempt to lay before you details respecting a seaman whose naval career and professional merits have already been ably and succinctly delineated by his old associate in arms, Admiral Smyth, in the Journal of the Royal Astronomical Society. Due honour to his name and deeds will doubtless further be paid in the ensuing anniversary discourse of the President of the Royal Society, of which parent body he was also a distinguished

member. In the mean time many salient and characteristic anecdotes of him having been chronicled in periodicals,* my present aim will be confined to a brief sketch of his career and the record of those incidents which directly connect him with the Geographical Society.

Born in the year 1774, young Beaufort owed his first instruction in geography to his father, the vicar of Collon and rector of Navan in Ireland, who made one of the earliest good maps of that country. Entering as a cadet in the East Indiaman *Vansittart*, he assisted in surveying the Strait of Banca, and narrowly escaped death after shipwreck. Serving successively in different ships of the Royal navy, he took part in Lord Howe's memorable victory of the 1st of June, 1794, and acting under Admiral Cornwallis was present in his celebrated retreat of the 17th of June, 1795, and assisted in the capture of many privateers and other ships of the enemy. On the coast off Malaga, he afterwards captured the Spanish polacca *San Josef* when protected by batteries and a privateer by boarding her from boats; not, however, without receiving many wounds, for which splendid service the young Lieutenant was rewarded with the rank of Commander. From that period (1800) until he obtained the step of Captain in 1810 he was busily employed in convoying fleets to India, partaking in the expedition to the Rio de la Plata in 1807, or hovering round the enemy's ports in Europe. In command of the fine frigate *Frederikstein*, he surveyed the south coast of Asia Minor from 1810 onwards, and afterwards gave to the public that remarkable work 'Karamania,' which holds so high a place among our standard writings on geographical and antiquarian science. While on the survey of that coast he was badly wounded by a Turk, but was still enabled to complete his work so as to supply excellent charts for the Admiralty of the coast of Karamania. After some interval our deceased member was appointed in 1825 to the post of Hydrographer, which he filled with unrivalled success until two years before his decease, when his advanced age and infirmities compelled him to resign, to be succeeded by his distinguished *élève* Captain Washington.

In reviewing the useful and practical life of Beaufort, it can truly be said that during 26 years he so directed the Hydrographical Office that it became the model which all other governments sought to follow. It was indeed gratifying to men of science to see the

* *See* particularly a lively and characteristic sketch of Sir Francis Beaufort, 'Daily News,' January 15, 1858.

friend and companion of Wollaston, of Young, and of Davy placed at the head of the Scientific branch of the Navy—not as a mere servant of a Board, but as a man with mind and energy to think and act for himself. Nor was it long before proofs of his influence and activity became visible. Seconded by an able staff of surveyors, proud to serve under one so competent to appreciate their labours, he soon gave them occupation. FitzRoy, worthy pupil of such a master, was despatched to complete the survey of South America; Belcher, Kellett, and Wood were sent to examine the south coast of Central America and of Mexico; Vidal, Denham, Skyring, and Arlett were charged to complete the west coast of Africa; Blackwood and Owen Stanley, names dear to every lover of science, undertook the survey of the north-east coast of Australia and of New Guinea. Sulivan went to the Falkland Isles and the river Plate, Stokes and Drury to New Zealand, Bate to Paláwan, Belcher, Kellett, and Collinson to China, Owen and Barnett to the West Indies, Bayfield and Shortland to the St. Lawrence and Nova Scotia, Graves and Spratt (the pupils of Mediterranean Smyth) to the Greek Archipelago, Hewett to the North Sea, Beechey to the Irish Sea, while many others spread their labours over different portions of the coasts of the United Kingdom. Forbearing on this occasion to expatiate on the merits of the many distinguished and zealous surveyors who carried out these researches in various quarters of the globe—men whose names have been often mentioned in our volumes, and some of whom have obtained our highest honours —I have no hesitation in affirming that the master mind of Beaufort, which directed such noble efforts during a quarter of a century, did more for the advancement of maritime geography than was effected in the same time by all the surveyors of other European countries united. Nor was it seamen only—but all men of science, as well as every traveller and geographical explorer of unknown lands, whether native or foreign, who always obtained from him the clearest information, which was communicated in the heartiest manner. Indefatigable in the transaction of business, and not trusting to others what he could do with his own compass and pen, there was no public servant who more uprightly served his Sovereign and his country.

By his official labours he brought up maritime surveying to the state of improvement it now exhibits. Beginning with our own shores at a period when all knowledge respecting them was fearfully inaccurate, he originated that series of works which, as I have

already mentioned, he extended to nearly all the coasts of the world. Nay, he also issued so long ago as 1831 those instructions for deep sea soundings which Lieutenant Maury and others have since matured. Such great plans were, indeed, but commensurate with Britain's naval supremacy, and were really called for. Although much was done, still much more might and would have been done had Beaufort had his way; but parsimony (such, indeed, as seems to be periodically and, as it were, spasmodically exerted by economists in depressing our naval and military establishments) threw back, for a quarter of a century, those results which our lamented member would speedily have obtained, to the great advantage of the nation and the saving of innumerable lives from shipwreck!

Whilst presiding over geographers, let me further remind you of the obligations of the nation to Francis Beaufort independently of his intensely hard official work. For, he was the individual of that Society which, under the guidance of Lord Brougham, gave such an impetus to the Diffusion of Useful Knowledge, and who laboured perseveringly and successfully for many years in editing and bringing out the collection of maps issued by that meritorious body. From the allusion to a Society in which I played a much more humble part, I hope to be excused if I say a few words respecting my own connexion with the late Hydrographer, as they may serve to shadow forth to those who knew him not, other traits of his noble character.

First making his acquaintance at the house of the illustrious Wollaston, I could not fail to observe in both these great men the same truthful singleness of purpose and the same inflexible resolution to carry out their well-matured designs for the advancement of science. Always admiring and cultivating the friendship of Francis Beaufort, it has been my pleasing duty, whether as your President or one of your Council, to have had much intercourse with him, and also to have had the honour of being associated with him in drawing up some instructions for the exploration of distant realms. On no one, however, of those occasions have I seen the kindliest feelings of his breast so much roused, as during the recent efforts of this Society to animate the country and the Government to make a last search for Franklin and his missing ships. In all the great tentative efforts which Britain made during a series of years to discover the traces of that lamented navigator, Francis Beaufort was indeed ever (as he is represented in a well-known engraving)

the centre of that group of distinguished explorers and friends of the missing navigators — the animus from which proceeded the devices and arrangements of the Arctic expeditions.

As he never abandoned hope, so long as his mind's eye could discern in the distant perspective a single plank of the *Erebus* and *Terror*, nor shrunk from endeavours, so long as there was the remotest chance of saving the life of one of the fine young officers and men of Franklin's ships, I recur with delight to the scene when, in his 83rd year and reclined upon his couch, his face beamed with joyous hope when he put his hand to that memorial which I had the honour to present to Her Majesty's Government, praying for a last and limited search after the relics of the missing expedition. Nor, when that appeal, which sought to send a Collinson once more to the area which he had so nearly approached, and from which he so skilfully brought back his ship, had unfortunately failed, can we forget with what renewed fervour the retired and venerable Hydrographer united with us in promoting and sustaining the efforts of the magnanimous woman who alone undertook the task of sending out the expedition under M'Clintock, to the issue of which we all now look with such deep anxiety.

In short, it was a genuine and innate kindness of soul, united with the highest moral worth and the brightest intellect, as displayed throughout his long life, that attached every friend to him with an abiding regard, and obtained for Francis Beaufort a reputation which will endure as long as the English nation shall honour one of her truest worthies.

Sir Francis Beaufort attained the rank of Rear-Admiral in the year 1846, and in 1848 was decorated with a Commandership of the Bath. He had also the honour to be a Corresponding Member of the Institute of France, a D.C.L. of Oxford, and an honorary member of various foreign Societies. He had long been a distinguished Fellow of the Royal Society; was one of the founders of this Society, and I need scarcely remind you that he was ever the most zealous and enlightened supporter of our onward progress.

In the Obituary of last year I spoke to you of the merits of one of the brightest lights of British geological science in the late Dean Buckland, and now it is my sad duty to advert to the other kindred spirit of the University of Oxford, the Rev. William CONYBEARE, Dean of Llandaff, who, when I entered upon the pursuits of geology, was one of my respected leaders, and to whom I became sincerely attached. The son of the rector of Bishopsgate, and the grandson

of a dean of Christchurch, William Conybeare was born in 1787, and educated first at Westminster; his earlier acquirements being matured at Oxford, where he was distinguished as a scholar. He no sooner quitted the University of Oxford, in which he had taken high honours at the same time as the late Sir Robert Peel and the present Archbishop of Dublin, than he spent the leisure hours of a country clergyman in recording the natural phenomena of the subsoil and its products. Becoming a member of the Geological Society, he gave to that body his first Memoir in 1814, and eventually prepared, in conjunction with Mr. W. Phillips, 'The Geology of England and Wales' (1822). By that excellent work, of which his associate undertook the mineralogical portion only, Mr. Conybeare fairly established himself as one of those who, following in the track opened out by William Smith, of identifying strata by their fossils, were the founders of that British geology which has sent its types and nomenclature through the world.

Any one who may refer to this volume will see how invariably the author adopts the true method of geological arrangement, by beginning the description of each natural deposit in the crust of the globe by a clear delineation of its geographical outlines and the character of the country. Even in his 'Introduction' we find comprehensive views of the structure of the earth enunciated with the enthusiasm of a real lover of geographical discovery, when he thus incites the geologist to push on fearlessly in the search after truth—"how little comparative curiosity should we feel concerning the course of the Niger or the North Coast of America could they be as easily examined as the Thames and the Channel!" In every chapter of the same work we meet with sketches of the surface and external characters of each tract, as well as the heights of the hills, and the phenomena of wells and springs (all of them integral geographical data), duly interwoven with an account of the chemical and mineral qualities of the subsoil, the imbedded fossils, and the erosion and fractures to which the strata had been subjected. Again, the long, coloured section, from the Land's End on the west to the German Ocean on the east, is in itself a fine sample of the generalising powers of Conybeare; for although geology has made vast strides since the year 1822, many of the features of this remarkable picture of the then state of our knowledge are still as true as when the author sketched them with the bold hand of a master.

In the same year Mr. Conybeare also displayed his talents as a

naturalist and comparative anatomist, by his notice of a then unknown fossil reptile, which he showed to be a link between the ichthyosaurus and the crocodile, and to which he assigned the name of plesiosaurus. This memoir, and another on the same subject in the succeeding year, created a most lively sensation among all naturalists, and winning the admiration of Cuvier, obtained for our deceased Associate the honourable post of correspondent of the Academy of Sciences. But I will not attempt to enlarge on these geological and palæontological triumphs, as my contemporary General Portlock has done ample justice to them in his recent Presidential Discourse, addressed to the Geological Society, in which he has successfully delineated the scientific merits of William Conybeare.

Retiring gradually from the toils of the geologist, and restricting himself to those clerical duties and theological readings which enabled him to obtain the dignity in the Church which he occupied for some years before his death, the last geological effort of Mr. Conybeare was his Report on the Progress of Geology, which, as a spectator more than an active workman, he gave to the British Association for the Advancement of Science, when they held their first meeting at Oxford in 1832.

The masterly manner in which he then grouped the various data, and recorded the advances made in the years which had elapsed since he was himself a contributor to the science, produced a deep feeling of gratitude on my part; for he encouraged me by the assurance that the distinction which had then been recently conferred upon me by placing me in the chair of the Geological Society had been worthily vindicated by my labours in the North of Scotland at one end of the European scale, and in the Alps at the other, as exhibited in a great section across Europe which he had prepared.

This approval of so eminent a man was indeed a main cause in leading me to make other exertions, which up to this day have not been discontinued; and whatever little merit they possess, I feel that they have been to a great degree elicited, first by the works and example, and then by the advice and approbation, of William Conybeare. For, even in succeeding years, when retired in his deanery at Llandaff, he again incited me, after my journeys in Russia, at once to publish a geological map of Europe; saying that the area which, in conjunction with my friends, I had laid down in that vast empire would enable any compiler to deprive myself

and associates of the honour which justly belonged to us, of producing the first Geological Map of Europe arranged on the principles of British classification.*

Long as I have been connected with the pursuits of science, I never yet met with any one of its cultivators who had a more ingenuous love of truth than Dean Conybeare; and I can safely affirm that he was universally beloved in the Geological Society, in which he bore so conspicuous a part. In addition to his scientific acquirements, the Dean of Llandaff was one of the best Greek scholars of his day, and was as deeply read in classics as in that ancient literature of the Church, in the study of which he passed many of the latter days of his life—happy in seeing that the true learning, high principles, and right feeling which he had implanted in the minds and hearts of his sons (of whom, alas! he had lost two) were raising them in the walks of life they had respectively embraced, to positions in which they are doing all honour to the name of Conybeare.

Rear-Admiral Sir John Ross, K.T., C.B., who was born in 1777 at Balsaroch, Wigtonshire, entered the Royal Navy in 1786, served in the Mediterranean until 1789, and afterwards in the Channel. He was in the expedition to Holland, and also under Sir James Saumarez. In 1808 Lieut. Ross acted as Captain of the Swedish fleet, and was made a Commander in 1812. During his war services in three different actions he was wounded thirteen times.

In 1817 the Admiralty having resolved to attempt to solve the question of the North-West Passage, Commander Ross was appointed to the *Alexander*, and Lieut. W. E. Parry to the *Isabella*; they sailed in 1818, and having made the circuit of Baffin Bay, returned to England the same season, when Ross was promoted to the rank of Captain. In 1829, aided by the munificence of Mr. Felix Booth, he purchased the *Victory*, a steam-vessel of 150 tons, to follow up the discoveries already made in the direction of Barrow Strait.

The *Victory* sailed from England in 1829, Commander (now Sir) James Clark Ross being second in command. Having visited the

* As soon as the geological map of Russia was published (1845), embracing nearly two-thirds of Europe, and that my colleague de Verneuil had produced a map of Spain (the only then remaining *terra incognita geologorum* of Europe), it was evident that a general map might then be constructed chiefly by compilation. I delayed so long in profiting by the sound advice of Dean Conybeare, that when my map of Europe appeared in 1854, it was soon followed by the large and brilliantly coloured map of Dumont of Liège. The cartographer will at once see, by comparing them, how vast a portion of the work of my eminent Belgian contemporary has been derived from the map of Russia.

wreck of the *Fury*, in Regent Inlet, the *Victory* reached Cape Garry in August, 1829, and thence proceeded South-West to lat. 70° North, and long. 92° West, when an impenetrable barrier of ice finally compelled her to winter in Felix Harbour. During 1830 Captain Ross could only move the *Victory* about four miles, and in the following year merely gained a port fourteen miles farther, now named Victoria Harbour, where, after another winter, he abandoned his vessel, in May 1832. Exposed to much danger, the party made their way northwards to about lat. 74° North, and long. 90° West, but want of provisions and the approach of winter obliged them to return to Fury Beach, which they reached on the 7th of October, about three years after the time they passed it on their outward voyage. Here they lived in a hut 32 feet long, made from the wreck of the *Fury*, and passed another dreary winter amidst privation and considerable suffering.

On July 8th, 1833, Captain Ross and his party made a last effort to escape. Dragging the sick to the boats, they embarked, and crossing the inlet to Cape York, reached a point East of Navy Board Inlet, where they fortunately got on board the whaler *Isabella*, formerly commanded by the gallant Captain himself, and in October they arrived in England, to the joy of us geographers, who, failing to induce the Admiralty to send out a searching vessel, had commenced a subscription for the purpose.

In the same year 1833 Capt. Ross deservedly obtained the Gold Medal of this Society "for discovery in the Arctic Regions of America," and the Gold Medal of the Geographical Society of Paris, together with various foreign orders, including that of the Swedish Polar Star; and in December, 1834, he received the honour of Knighthood together with that of C.B.; his patron, Mr. Felix Booth, being raised to a Baronetcy by King William IV., who entertained a personal regard for our deceased Associate. A committee of the House of Commons assisted by scientific men appointed to investigate the results of this expedition declared that they saw no reason to doubt that Captain Ross nearly approached, and that Commander James Ross had actually reached, the Magnetic Pole.

Sir John Ross was the author, among other works, of Letters to Young Sea Officers, Memoirs and Correspondence of Admiral Lord de Saumarez, and a Treatise on Navigation by Steam: he also translated and edited a Memoir of Admiral de Krusenstern, which was dedicated by permission to this Society.

This gallant officer and persevering explorer was promoted to

the rank of Rear-Admiral in July, 1851, and died in November, 1856.

By the death of the Rev. Sir Henry DUKINFIELD, Bart., I lose one of my oldest and most stedfast friends. He was the third son of Sir Nathaniel Dukinfield, Bart., of Stanlake, Berks.

Educated at Eton and Oxford, and there forming intimacies which lasted through life, Henry Dukinfield had been for many years a zealous and devoted provincial clergyman before he succeeded to the title by the death of his elder brother Sir Lloyd. After he had performed his duty in an exemplary manner for 18 years as Vicar of St. Giles's, Reading, that eminent scholar the late Dr. Blomfield, Bishop of London, selected Sir H. Dukinfield to assume the important duties of Vicar of St. Martin's in the Fields, most of the parishioners of which were, at that time, in avowed hostility to their pastor. And never were duties more earnestly, sedulously, and honourably performed. His influence throughout that populous parish became so felt from the peer to the humblest artisan, and he so laboured in calming rivalries and disputes in the vestry, that when from the state of his health he found himself compelled to retire from the active scene, he received the heartiest thanks from all his flock, as well as from numerous Dissenters; with the expression of their deep regret at being deprived of his aid and counsel.

Having long thought that habits of cleanliness were essential to the raising of the humbler classes in their moral condition and well being, he worked out and completed a favourite scheme at which he had been labouring for some years, of establishing cheap public baths and wash-houses; and though necessarily excluded by his profession from a seat in Parliament, the Act which sanctioned these highly useful adjuncts to the comfort of the people is, and will always be, known as *Sir Henry Dukinfield's Act.*

After retiring from St. Martin's, and during his latter years, far from being contented to live a life of idleness, he never failed (and, as I can testify, often when unwell) to assist his overworked brethren in the Church. He also took the liveliest interest in establishing the New Hospital for Sick Children, and so supported it for six years by personal superintendence, preaching sermons, and procuring subscriptions in addition to his own, that as chairman of the Committee he was justly considered the mainstay of that useful establishment.

With these legacies to his country, Sir Henry Dukinfield left behind him such a character for probity, kindness of heart, and un-

tiring zeal in the promotion of every philanthropic object, united with the manners of a high bred gentleman and the acquirements of a scholar, that he was justly regarded as a pattern of a Christian whose deeds were continual proofs of the sincerity of his faith. He married the widow of the distinguished Peninsular officer Lieutenant-General Chowne, who, as well as his only sister Mrs. Prichard Smith, survive to mourn his loss. As he left no male heir, the ancient baronetcy conferred by Charles II. on the son of the "gallant and honest" Colonel Dukinfield of Dukinfield, Cheshire, so distinguished in the Civil Wars, has become extinct.

Sir George DUCKETT, Bart., M.A., F.R.S., who was one of the early Members of this Society, having joined it at its commencement, in 1830, died on the 15th of June last, at the age of 78. He was the son of Sir George Jackson, Bart., formerly Secretary to the Admiralty and Judge Advocate, and many years M.P. for Colchester and Weymouth; the name of Duckett having been assumed after his maternal grandfather. He represented Lymington from 1807 to 1812, was a Deputy Lieutenant for Herts, and at one time was Colonel of the West Essex Militia.

Sir George was a zealous supporter of science, a profound classical scholar, and a good linguist; having translated various Scriptural works from the German. In private life he possessed many amiable and excellent qualities, and his death was deeply deplored by all those who knew his worth.

Charles William, Earl FITZWILLIAM, K.G., F.R.S., another of the early members of the Society, died on the 14th October last, at the age of 71. The only son of William, fourth Earl Fitzwilliam, he was educated at Trinity College, Cambridge, and as Lord Milton represented the county of York in the House of Commons in seven successive Parliaments between the years 1807 and 1833, and succeeded to the Earldom on his father's death that same year. Earl Fitzwilliam was essentially manly and honest as a public man, and among the many traits of benevolence by which his conduct was characterised, no one was more conspicuous than his early and unceasing endeavours to bring about an abrogation of the corn laws. Blessed with a deep sense of religion, and largely exercising the gifts of charity, the liberality of this public spirited and upright nobleman extended itself to science both in a pecuniary form and in rendering personal assistance.

Nor had any one a juster appreciation of the public value of scientific pursuits. As far back as 1831, when few senators had

given encouragement to science, and when I was one of the few men who assembled at York to support the scheme suggested by Sir D. Brewster, and worked into an efficient system by my enlightened friend William Vernon Harcourt, Lord Fitzwilliam, in describing the benefits to be expected from the institution of the British Association for the Advancement of Science, over the first meeting of which he presided, thus spoke: "I hope that the meetings thus auspiciously begun, will rapidly advance to still greater importance, and become the source of incalculable advantage to science hereafter. In addition to other more direct benefits, I hope they will be the means of impressing on the Government of this country the conviction, that the love of scientific pursuits and the means of pursuing them are not confined to the metropolis; and I hope that when the Government is fully impressed with the knowledge of the great desire entertained to promote science in every part of the empire, they will see the necessity of affording it due encouragement, and of giving every proper stimulus to its advancement."

The death of this good and patriotic nobleman was as deeply deplored by all those persons of the upper and middle classes who partook of his widely-spread hospitality, as by the masses of the people, of whom he was the ardent friend and protector.

The life of Lieut. J. Baptiste HOLMAN, well known under the name of the "Blind Traveller," was a special illustration of the pursuit of knowledge under apparently insurmountable difficulties. At the age of twenty-five he was obliged to leave the naval service, a profession of which his active mind and singular aptitude for the acquisition of practical information would have rendered him a distinguished ornament. The illness which ended in the total deprivation of sight resulted from the anxious discharge of his professional duties. At first some hope was entertained that his sight would be preserved, but when at length it became certain that there was no prospect of recovering the power of vision, his resolution to adapt himself to these distressing circumstances showed at once that mental courage which was afterwards so remarkably developed. The appointment as a Naval Knight of Windsor seemed to afford an easy retreat from turmoil to a person in his circumstances. But the seclusion of Travers College was ill-suited for his anxious mind; and his bodily health also suffering from that routine life, he obtained permission to travel. His first journey, made in the years 1819, 1820, and 1821, was through France, Italy, Switzerland, and parts of Germany bordering on the Rhine, Holland, and the

Netherlands. The narrative of these travels went through four editions.

In his next journeys he traversed Russia, Siberia, Poland, Austria, Saxony, Prussia, and Hanover, during the years 1822, 1823, and 1824. While passing through the Russian territories he was suspected to be a spy, and was conducted as a state prisoner from the interior of Siberia to the frontier; having penetrated during that journey to 1000 miles beyond Tobolsk. Nor is it the least wonderful feature in these enterprises that, although when at home he was always attended by a servant on whose arm he leaned, he never on any occasion took a servant abroad, always travelling alone, and trusting to his own sagacity, and the sympathy which never failed him wherever he went, for safe conduct through all emergencies and perils. His Russian travels, curious in their details and full of adventure, ran through three editions.

In 1834 he published his principal work, recording a still wider field of research, entitled a 'Voyage Round the World,' in four volumes. This publication was dedicated to Queen Victoria, through whose kindness he had previously obtained a dispensation from residence at Windsor; an act of gracious protection which he spoke of to the last hour of his life in terms of deep gratitude. The 'Voyage Round the World' may be considered his most elaborate production. It embraced the Journals of a vast route, including Africa, Asia, Australasia, and America, as explored between the years 1827 and 1832; and is, in reference to the mass of information it contains, and the peculiar situation of the author, an extraordinary literary monument of energy and perseverance.

Although Lieut. Holman had now twice circumnavigated the globe, visited most countries, and made himself familiar with their geography, internal industry, and external relations, the passion for exploring distant scenes and gathering fresh information survived even the physical strength necessary to its safe indulgence. Of him, indeed, it may be said, that his eager soul subjected its feeble tenement to the severest tests. Few men of the strongest constitutions could have endured the fatigues which the Blind Traveller voluntarily undertook; and at an age when most men seek repose, he was still found in motion, on the Danube or near Constantinople; attending to the processes of wine making in Portugal, or visiting the scene of some Scriptural tradition at Jerusalem. His last journeys were made through Spain and Portugal, Wallachia, Moldavia, and Montenegro, Syria and Turkey, and his final employment was the

preparation for the press of his later journals, which experience and matured observation had rendered more valuable than any of his former records of travel. The whole of these, and a large mass of miscellaneous papers, are in the hands of his friends, and it is to be hoped they will be given to the public, accompanied by an adequate biography of this remarkable man. The character of Lieut. Holman was eminently calculated to command respect and conciliate attachment. Patient, gentle, and firm, he was beloved by his friends, and won the confidence and regard of the numerous and varied circles by which he was at different times surrounded.

Mr. Joseph Ravenscroft ELSEY, who died in January last in the West Indies at the early age of twenty-four, had already distinguished himself as a naturalist and explorer, as recorded in our Journal.

Educated at the London University and College of Chemistry, and passing at the Royal College of Surgeons, he was appointed as surgeon and naturalist to the North Australian Expedition, under our Medallist, Mr. A. C. Gregory. The zealous and efficient manner in which he fulfilled the arduous duties attached to his post, during twenty months of toilsome travel, won for him the high praises of his commander, and the friendship and admiration of his associates. On his return to England he communicated a paper to this Society on North Australia, and was soon after offered the appointment of Government surgeon at Seychelles, which he however declined, preferring to go to the West Indies, with a view to the collection of natural history specimens. He had scarcely been six weeks at his post when he was attacked with what at first appeared a slight illness, but which soon terminated fatally; and there is too much reason to believe that his untimely end was attributable in great measure to over-fatigue and privation when engaged in the North Australian Expedition.

The late Earl SPENCER, K.G., was born at the Admiralty, Whitehall, his father having for many years presided over that department of the Government. He adopted the Navy as his profession, entering that service in 1811, a few months before he attained his fourteenth year. In September, 1825, he was appointed to the command of the *Talbot*, 28. While in that ship he served in the Mediterranean, under the late Admiral Sir Edward Codrington, in which he fought with distinction at the battle of Navarino, was present at the capitulation of Patras, and assisted at the reduction of the Morea Castle. For his conduct at the battle of Navarino the

noble Earl received the honour of C.B. In the latter years of his life he served as Lord High Steward of Her Majesty's Household, and was made a Knight of the Garter. Feeling that his health was rapidly giving way, he retired from office, and shortly after, on the 27th December, 1857, he expired, to the regret of his Sovereign and his numerous friends.

William Wilberforce BIRD, who was born in 1784, was the eldest son of W. Wilberforce Bird, of the Spring, Kenilworth, and Member for Coventry. In his boyhood he was at school at Warwick, but was sent to complete his education at Geneva. In 1802 he was nominated a member of the East India Civil Service, and went to Calcutta in 1803. After passing through the College of Fort William with considerable distinction, he was stationed at Benares, where he was early placed in situations of singular difficulty and importance. On one occasion, in the year 1809, a religious disturbance broke out, attended with great destruction of life and property, and it became necessary to call out the troops, whom he personally conducted into the heart of the city, and was enabled to disarm and disperse the infuriated people, and restore tranquillity. On another occasion an insurrection, in resistance of the introduction of the house-tax, which threatened very alarming consequences, was put down through the exertions of Mr. Bird; the multitudes being dispersed without the loss of a single life.

For these services Mr. Bird received the highest approbation of the Government for "the prudence, firmness, zeal, activity, and judgment which had marked all his proceedings." After this time, Mr. Bird was selected for other important situations, where peculiar fitness was required; and having been successively placed in the highest offices, both judicial and financial, was at length appointed a member of the Supreme Council of India, of which, in the absence of the Governor-General in the North-West Provinces, he became the President, and was four times nominated Deputy-Governor of Bengal, with the duties of which office he was entrusted during the whole period of Lord Ellenborough's administration. When that nobleman was recalled, Mr. Bird succeeded him as Governor-General of India until the arrival of Sir Henry (the late Lord) Hardinge, whose first act was to re-appoint him Deputy-Governor of Bengal. Mr. Wilberforce Bird took a prominent part in all the great questions of the time, and was particularly instrumental in the abolition of suttee, the suppression of

slavery, the discontinuance of state lotteries, the extension of Native education, and the more general employment of well-qualified Natives in the administration of public affairs. In 1844, having been in the service of the East India Company forty-one years, he retired, and returned to England. On his departure from Calcutta, addresses were presented to him by the European and Native inhabitants, expressive of their sentiments of respect and esteem for his character and conduct, both as a public officer and a private gentleman. He passed his remaining days in the privacy of domestic life, beloved by all his friends, and particularly by his associates of the old Raleigh, now the Geographical, Club. He died in London, after a few hours' illness, on the 1st June, 1857, aged 73.

The Rev. Dr. SCORESBY.—Although it is not my bounden duty to offer to you sketches of the lives of our countrymen who have not been members of our body, yet when a very remarkable explorer, voyager, or geographer, who has not joined us, is taken from this world, I follow the practice adopted some years ago of attempting to bring the striking points of his character to your mind's eye. A man eminently entitled to be thus singled out was the late Dr. SCORESBY, who, at the early age of ten years, commenced his career as a seaman under the auspices of his father, one of the most successful captains of the port of Whitby in the Northern whale fishery. Thus early inured to the hardships and perils of the Arctic seas, his mind was developed by the employment of the winter months in pursuing a course of study at the University of Edinburgh, where his assiduity and ability gained him the friendship of the professors, and laid the foundation of that knowledge which enabled him subsequently to offer in so admirable and clear a manner an account of the Arctic regions.

As chief mate of his father's ship, the *Resolution*, he had the honour of navigating to the highest northern latitude then attained by any vessel, viz. 81° 30′; and though Sir E. Parry, in his celebrated boat expedition during his fourth voyage in 1827, arrived at 82° 45′, the distinction of being second in the approach to the Pole yet remains with Scoresby and his father.

The account of the Arctic regions, being the result of 17 years' experience in those seas, appeared in 1820, in two volumes; and besides a vast amount of statistical information relative to the whale fishery, then the most important nursery for our seamen, this work contains so great a mass of scientific observation that it is still a text-book of nautical science.

In 1822 he succeeded in reaching the east coast of Greenland, which, by his indefatigable labours, was laid down on charts from the 70th to the 75th degree of latitude, and, taking in the bays and fiords, a coast line of 800 miles was defined correctly, and errors of previous charts, amounting to no less than 7° of longitude, corrected. An account of this remarkable voyage (dedicated by permission to King William the Fourth) was published the following year; and in a copious appendix, the pages devoted to mineralogy, botany, zoology, and meteorology, evince to what great profit the author had studied at Edinburgh.

In the course of a visit to the island of Jan Mayen, Scoresby detected one of the most remarkable proofs of the effect of the equatorial current. He found on the shores of that singular island (recently visited by Lord Dufferin) pieces of drift wood bored by a ptenus or pholas, neither of which animals ever pierce wood in Arctic countries, and hence he concluded that the worm-eaten drifted fragment had been borne by currents from a transpolar region. The notion of a constantly open polar sea Dr. Scoresby always believed to be chimerical.

He was the first also to attempt observations on the electricity of the atmosphere in high northern latitudes, and his experiments made with an insulated conductor eight feet above the head of the main-top-gallant mast, connected by a wire with a copper ball, attached by a silken cord to the deck, are still regarded with interest for their novelty and ingenuity.

This collection of scientific data was never permitted to interfere with the main objects of the voyage, in the pursuit of which he was most successful, and, notwithstanding a resolute determination, that the sanctity of the Sabbath should never be violated by the pursuit of the whale, his ship usually returned the fullest of the season. Some idea of his constant zeal may be found in the expression which he uses, that, when he went into the ice, he considered it was his own watch on deck until extricated at the close of the season.

Abandoning nautical pursuits in the year 1823, Mr. Scoresby gave a fresh and remarkable proof of his unbounded energy and great ability by mastering the difficulties attendant upon the adoption of the career of a divine. Setting to work with the assiduity of youth, he graduated at Queen's College, Cambridge, as B.D., in 1834, and was inducted to that Church of England of which he became a distinguished ornament. In short, he devoted many years of his life

to the arduous duties of chaplain among seamen, whose religious welfare he most zealously promoted; his sermons, while they breathed the true spirit of Christianity, being strengthened by a tone of philosophical reflection which imparted to them much dignity and freshness.

In the progress of Arctic exploration Scoresby continued to take the deepest interest. Although he had thought, from the first, that the attempts to find a North-West passage to the China Seas would prove to be unprofitable for political or commercial objects, he considered that the scientific results justified all the risk and expense of such expeditions; maintaining that, even in regard to financial returns to the nation, the establishment of the Davis Strait fishery and of the trade of the Hudson Bay Company had compensated for the expenditure of public money in the early voyages of discovery.

The scientific career of Dr. Scoresby in the latter years of his life is well known. He became a Fellow of the Royal Society in 1824, and subsequently was elected a Correspondent of the Section of Geography and Navigation of the French Academy of Sciences. The Edinburgh Philosophical Journal and various scientific periodicals were enriched by occasional contributions from his pen on a variety of subjects of natural history and meteorology. To the observations of magnetical phenomena he had long devoted close attention, and his investigations, published at intervals from 1839 to 1843, and the concluding volume in 1848, contain a vast amount of valuable materials for sound induction. His reports to the British Association, at the meetings of which body he was a frequent and welcome attendant, and his numerous observations on the influence of the iron of vessels on the compass, were connected with inquiries of the utmost practical importance to navigation. It was in prosecuting these researches, and with a view to determine various questions of magnetic science, that Dr. Scoresby undertook a voyage to Australia, from which he returned last year, with his constitution much enfeebled by the arduous labours he had undergone.

Of this good man we may truly affirm that his name will ever be remembered with honour among those who by their character and services have sustained the reputation and extended the influence of the British name by the peaceful triumphs of science and philanthropy.

Dr. Baron von REDEN was born in the beginning of the present century, in the kingdom of Hanover, and was well known for his good statistical and geographical works on Germany, Austria, and

Russia. He was chief director of the Statistical Bureau in Vienna, and possessed a considerable private collection of valuable ancient and modern geographical maps, was a Vice-President of the recently-formed Imperial Geographical Society of Vienna, and died unexpectedly a few months since.

At the last Anniversary, I laid before you a brief sketch of the discoveries of the ardent young explorer and good astronomical observer VOGEL, and reported the rumours of his death, but hopingly threw doubts upon their accuracy. Alas! they have proved too true; and since then the assassination of his faithful assistant Maguire, who was bringing home many geographical records, has cast a sad gloom over the exploration of Central Africa, and teaches us how grateful we ought to be for the escape of even the living traveller, Barth, who is now giving us so much information respecting those turbulent tribes.

The death of Vogel appears to be placed beyond a doubt by the account of the envoy of the King of Darfur, who arrived last autumn on an amicable mission to the Viceroy of Egypt. He relates the rumours which had reached him before he left Darfur, and repeats their details with minuteness. Much of his account refers to the proceedings of Dr. Vogel's colleagues; and as we know that what relates to Barth is accurate, there appear to be no grounds for doubting the truthfulness of the remainder, especially as the place where Vogel is said to have been executed by the order of the barbarous King of Wadai is at no great distance from Darfur.

Edward Vogel was the eldest son of Professor C. Vogel, Director of the Public School in Leipsic, where he, at an early age, exhibited a strong predilection for astronomy, there being a good observatory in that city. He afterwards completed his studies under the celebrated Encke at Berlin. Concluding his academical training, he came to England, I believe, in 1851, and was employed in the observatory of Mr. Bishop until he was sought out to proceed to Africa early in 1853, and join Drs. Barth and Overweg.

On the eve of his departure, when he was full of ardour and hope, I made his acquaintance at the house of his patron the enlightened Prussian Minister, Chevalier Bunsen, when his ingenuous manners, intelligent conversation, and knowledge of the natural history sciences, in addition to sound astronomical acquirements, led me to conclude that he was admirably qualified to carry out his mission, particularly in determining the geographical position of many places in Africa. Alas! that he is not only taken from us,

but that with him and poor Maguire we lose a great portion of the results of his arduous explorations and accurate observations.

M. von Neimen, a young German gentleman of good family, who went to Egypt solely with the noble object of penetrating to Darfur and Wadai, there to ascertain the fate of Vogel, I regret to say, died of a lock-jaw at Cairo.

The fate of the faithful and intelligent Corporal Maguire has been already narrated to you in our Proceedings. In his last moments he exhibited the same unflinching tenacity and bravery which had marked his conduct throughout. Appalled by no sickness and intimidated by no foe, this fine specimen of a British soldier killed several of his murderous assailants before he lost his own life.

GEOGRAPHICAL PROGRESS.

Britain — Admiralty Surveys. — Following the plan of my last year's Address, I begin with the account of the Maritime Surveys of Britain, for the substance of which I am indebted to my eminent friend Captain Washington.

The Coast Surveys in course of execution under the orders of the Admiralty both at home and abroad have made steady progress during the past year. They are conducted by twenty different surveying parties, one-half of which are employed on portions of the United Kingdom, the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island, also in the Mediterranean, Coast of China, and Red Sea.

British Isles.—The Coast Survey of the United Kingdom has reached a point at which we can confidently predict that a very few more seasons will place the public, and all who take an interest in geography, in possession of a complete representation of the British Isles, not only as their shores, islets, and rocks rise above the level of high water, but also as the whole group reposes upon a bed circumscribed by a boundary line of 100 fathoms in depth.

The study of the configuration of that line is instructive. It shows that the group, although apparently broken up into three large, and countless small, islands, is physically connected on the south-east, through Belgium and Holland, with the continent of

Europe, while it is separated from Norway and Sweden by a gulf or fiord some hundred fathoms in depth. Probably it may not be generally known that some of the deep wells in London and Sheerness draw their fresh water from a stratum which lies fully 300 feet below the level of the bottom of any portion of the North Sea that intervenes between this island and the coasts of Belgium, Holland, or Denmark. The physical geographer will therefore find, if he examines them, that nautical charts teach something more than the mere depth sufficient for the wants of navigation. This undoubtedly is their first and main use; but in the course of a rapid summary of their labours during the past year, I shall be enabled to show you that the Admiralty Surveyors have sounded hitherto unfathomed depths both in the North and South Atlantic, in the Indian Ocean, and in the Red Sea, and have brought up sufficient of the bottom to enable geologists to explain the structure of new continents, now forming at a depth of 2000 fathoms below the surface of the water.

England.—The re-examination of the river Thames, to which I referred last year, under Commanders Burstal and Cudlip, has been completed from Putney to Woolwich, and laid down upon the large scale Ordnance plans of 60 inches to a statute mile—a minute and careful survey, which will form a valuable standard for reference hereafter, when the labours of the Thames Conservancy Board shall have dredged a deep, uniform channel, navigable at low water up to the London Pool. The deepening of the bed of the river, consequent upon the removal of old London Bridge in the year 1832, has been striking, and holds out encouragement to reconstruct the old-fashioned bridges at Newcastle, Wexford, and Cork, which now act as dams in their respective rivers, as the Tyne, the Slaney, and the Lee.

On the east coast of England the chief topographical changes consist in the improvement of the entrances of the several tidal harbours. The channel of the Tees has been dredged and trained to a fair curve, which can hardly fail to deepen itself. A chart of Tees Bay, on the scale of 3 inches to a mile, has recently been published at the Admiralty. It includes Hartlepool and Redcar, and thus shows at one view all the sites that have been recommended in this immediate locality for a harbour of refuge—an imperative work that can no longer be delayed, when we look at the fearful loss of life from wreck that annually occurs on this coast. At the entrance of the Tyne large works are in progress, which we trust may do somewhat to improve the mouth of that important river, in

and out of which no fewer than 45,000 vessels pass yearly—a traffic only paralleled by that of the ports of London and Liverpool. At Blyth, too, much has been done to improve the entrance, and to guide the flood and ebb streams into one channel.

On the south coast of England the surveying party under Commander Cox and Messrs. Usborne and Davis are still engaged in the examination of the inner portions of Plymouth Sound, including Catwater and Hamoaze, as far as Keyham, in the course of which they have examined 27 miles of harbour coast-line, and sounded over 50 square miles. In Cornwall Captain Williams and Mr. Wells have surveyed 15 miles of the open coast from St. Germain's Beacon westward to the entrance of Fowey, with plans of the small harbours of Charlestown, Par, Polkerris, and Polperro, and sounded over 47 square miles. At the northern entrance of the Bristol Channel, Commander Alldridge and Mr. Hall have been employed on the rocky passage known as Jack Sound, where they have mapped 21 miles of open coast line, and sounded over 40 square miles, discovering many dangerous rocks hitherto not marked on our charts.

Farther north, on the West coast, Mr. E. K. Calver has sounded the new refuge harbour of Holyhead, which already has afforded shelter to 3500 vessels during the past year, and is daily more resorted to as it becomes known. He has also resounded the packet-harbour at Portpatrick, and has generally examined the coast and harbours between Bardsey Sound and Ardrossan, including the newly-formed harbour at Silloth, on the English side of the Solway Firth, and has shown that there exists a channel, having 15 feet at low water, for which the mariner, in case of need, may safely run his vessel at a time when the tidal harbours along this portion of the coast cannot be approached.

Scotland.—In Argyleshire Commanders Bedford and Creyke and Mr. Bourchier have been employed on the coasts of Mull, Iona, Ulva, and Loch Etive, with the numerous adjoining islets, in the course of which work they have surveyed 112 miles of sea-coast and loch, and sounded over 90 square miles. In the detailed statistics which Commander Bedford has furnished of the progress of this season's survey, he states that the soundings were obtained by one officer, Mr. Bourchier, and his boat's crew; and it may give some notion of the minuteness of the survey, when I mention that, in the space of 90 square miles, they took 13,000 casts of the lead, the greatest depth being 97 fathoms. The neces-

sarily slow progress of the survey of these intricate coasts will be better understood perhaps from this single fact than from any general description that I might give.

In Inverness-shire Commander Wood and Mr. Forbes have surveyed 15 miles of the open coast of the Isle of Skye, from Loch Eishart westward to Loch Breatal, including the Soay isles and the remarkable lochs Scavaig and Coir-uisk (so admirably described by Walter Scott), and sounded over 83 square miles, reaching six miles off shore, and into a depth of 140 fathoms; while Mr. Jeffery has examined 40 miles of coast between Malag and Ru Arisaig, including the shores of Loch na Gaul.

In the Hebrides Captain Otter in H. M. S. *Porcupine*, with her tender the *Seagull*, assisted by a good working staff, composed of Messrs. Dent, Stanton, Stanley, and Cramer, has examined the shores and islets of the Sound of Harris, comprising, with all their indentations, 155 miles of coast line, in addition to sounding over an area of 435 square miles. This is an important service rendered to hydrography, as with this chart and the accompanying sailing directions before him, the mariner may safely run for the passage between Harris and North Uist, which has hitherto been avoided by all who could possibly escape from it. The chart is in the engraver's hands, and will be issued to the public in the course of the summer. At the same time Lieut. Thomas and Mr. Clifton have surveyed the rocky estuary of East Loch Tarbert, in Harris, and completed a chart of that remarkable inlet of the sea.

In alluding to these and other charts of the coasts of Scotland, I have real pleasure, as one acquainted with the value of detailed land surveys, in expressing my admiration of the maps on the six-inch scale, exhibiting all the physical features, which Captain Otter, Commander Wood, and their associates have laid down for three miles inland. Such terrestrial coast surveys may enable geologists to come to accurate conclusions respecting the general structure of Scotland before the geographical details can be worked out on Ordnance maps representing the interior of the country, and which will probably not be published for many years to come, even under the vigilant superintendence of Colonel James.

In the Orkneys no new survey has taken place; but six plans of the most important anchorages, surveyed in the year 1850 by the late Commander Thomas, have been published by the Admiralty during the past year; they are Otterswick, Pierowall, Stromness, Deer Sound, Long Hope, and the approaches to Kirkwall, all on a

scale of three inches to a mile; with these charts, and guided by the lights, buoys, and beacons recently placed in these islands by the Commissioners of Northern Lights, the mariner may boldly run in case of need for the many sheltered anchorages which this group affords.

Ireland.—On the east coast of Ireland Messrs. Hoskyn, Aird, and Yule have completed the survey of Lough Carlingford, the coast adjacent, and the river up to the town of Newry, sounding over an area of 62 miles. In the course of this work a new deep-water channel, having 18 feet at low water, was discovered leading into the lough, which may materially aid in the execution of a plan which, it is understood, is shortly to be carried out, of rendering Carlingford Bay a harbour of refuge for the Irish Sea—an object greatly to be desired, and which might be effected at a trifling cost.

In Donegal, on the north coast, Captain Bedford, with Lieuts. Sidney and Horner, have mapped 50 miles of the shore line between Loughs Swilly and Foyle, including the remarkable promontory of Malin Head, and the Garvan and Innishtrahull group of isles, in the progress of which work 220 square miles have been sounded over, extending to 10 miles off shore. At the risk of being tedious, I must again be permitted to call attention to the statistics of this survey, during which more than 23,000 casts of the lead were taken, or on an average 35 casts to the square mile in deep water, and 625 casts to the square mile when within a depth of 10 fathoms. These are facts apparently trivial, but which all physical geographers, who care to have a *bonâ fide* representation of the submarine hills and valleys of our planet, will know how to appreciate. By permission of the Admiralty, the charts resulting from these surveys have been exhibited at our evening meetings, and have deservedly elicited your applause.

Those who are curious in such matters may like to know that the whole cost of such a survey to the country, including the soundings, when conducted in the most economical manner, is about 30*l.* per mile of coast line.

In Kerry, on the south-west coast, Commander Edye, with Messrs. Macdougall and W. B. Calver, have examined 26 miles of the exposed coast of that long, projecting peninsula which separates Tralee and Dingle bays, its extremity forming the westernmost point of the mainland of the British Isles. They have also mapped Smerwick Harbour. On this coast the chart of Kenmare river, the

work of the late Commander Church, has been published during the past year, and gives a graphic representation of that remarkable region, interesting both to the geologist and geographer.

The coast of Kerry has just now another and a deeper interest, as Valentia has been fixed upon as the Eastern or European terminus of the Atlantic Electric Telegraph cable, which it is proposed to submerge in the course of the next month, and on this occasion, we heartily trust, with complete success, as the first experiment afforded many useful hints which will now be taken advantage of. The preparatory line of soundings, to which I referred last year as about to be undertaken by Commander Dayman, was most successfully completed in H. M. S. *Cyclops*, which carried a line of deep-sea soundings across the Atlantic from Valentia to Newfoundland, the detailed account of which has been published and largely circulated, and therefore is probably familiar to many of my hearers. As I shall, in the sequel, treat of the natural history results of this survey, under the head of Physical Geography, I will only say that the shelf or bank on which the British Isles repose was found to extend to the westward as far as the meridian of 15°, or about 180 miles off shore, when it suddenly dropped from a depth of 500 to 1500 fathoms. From the foot of this submarine cliff the bed of the ocean held an undulating course, varying from 1500 to 2400 fathoms, which depth was reached in long. 26° W. From this point of greatest depth the bed of the ocean gradually rises until, in long. 50° W., it reaches the outskirts of the bank on which the island of Newfoundland rests; it is round to the north of this shoal that the telegraph cable is destined to pass into Bull Harbour, near the south-western angle of Trinity Bay. Fully appreciating the value of Commander Dayman's soundings, and experience as a pilot, the directors of the Company have made it a special request to the Admiralty that this officer, now in command of H. M. S. *Gorgon*, may be allowed to accompany and precede the U. S. ship *Niagara*, with the western portion of the cable (after the junction has been made in the mid-Atlantic), and pilot her to her destination. You will doubtless all join with me in heartily bidding them God speed.

Mediterranean.—Of foreign surveys the Mediterranean claims precedence, as its shores were the earliest seat of civilisation, and must interest alike the antiquarian, the scholar, and the geographer. Notwithstanding the classic works of Beaufort, Smyth, and their successors, we have yet only imperfect surveys and vague accounts of a large portion of this region. In last year's Address I had

occasion to make honourable mention of a survey of the Delta of the Danube in the Black Sea, by Lieut. Wilkinson, under the orders of Captain Spratt. This has now been completed for the Kilia branch as well as for the Sulina and the St. George; and the facts brought to light in the course of the survey of the advance of the alluvial delta in one part, and its washing away by the inroads of the sea in another, have been usefully turned to account by Captain Spratt, in his Report 'On the Comparative Condition of the Branches of the Danube,' as a warning to the engineers engaged in the improvement of that river to be careful how they place ponderous stone walls on so unstable a foundation. At the same time it is shown, that with simple guiding, and a free use of the dredging-machine, there is a fair probability of the Danube being so improved, that vessels of moderate draught of water may load their corn at Galatz, and convey it without transhipment to Western Europe in safety. The plans which I have mentioned, by Lieut. Wilkinson, will doubtless be in request at the approaching Paris Conferences on the subject of the Principalities, and will well repay the labour of those who consult them.

Following up his deep-sea soundings of last year to the eastward of Malta, Captain Spratt has made some experiments on the surface and submarine currents of the Sea of Marmora, in which he shows that the surface current gradually diminishes and vanishes at a depth of 40 fathoms, and that no counter current is found below; also that the density of the water is not perceptibly greater from that level to the depth of 1500 fathoms; from which depth he has brought up by his sounding-lead some beautiful specimens of minute, delicate shells of *Cleodora*, *Limacina*, *Spirialia*, *Atlanta*, &c.

The survey of the eastern half of the large island of ancient Crete, or Candia (the Kirit Adassi of the Turks), by Spratt, Mansell, and Wilkinson, has been published at the Admiralty during the past year, and for the first time we have an accurate representation of that fertile and beautiful island (with Mount Ida towering to a height of 7000 feet), which was formerly so populous and civilised that Homer * speaks of its hundred cities, Κρήτη ἑκατομπολις. In modern times, and we trust before the close of the present summer, this island is destined to form the connecting link between the lines of submarine telegraph that are to unite Constantinople and Alexandria.

* *See* notice of Crete, by the Right Hon. W. Gladstone, in his new work on the Odyssey.

On the coast of Egypt Commander Mansell, with Messrs. Brooker and F. Skead, his assistants, have mapped the shore from Alexandria to Damietta, with plans on a large scale of the Rosetta mouth and the Bay of Abukir; this completes the coast as far as El Arish, and forms a positive and important acquisition to our knowledge of the geography of these regions. I may here mention that Captain Spratt has recently drawn up a Memoir on the proposal for a Suez Canal, in which he disposes of the fallacious argument, that because the Delta of the Nile does not sensibly advance on the sea, therefore the river has ceased to bring down alluvium, by showing that the Delta has advanced to such a point that the stroke of the sea, arising from the prevalent winds, is sufficient to keep it in check, but that the detritus is still brought down and carried away to the eastward, and forms dunes and sandhills which, at Kas Burún, rise to a height of 270 feet above the level of the sea. The survey of the coast of Egypt having been finished, we trust that the time has arrived when the shores of Palestine and Syria will no longer be permitted to form the opprobrium of our maps, and that, in the middle of the nineteenth century, we shall at last ascertain the accurate geographical position of such ports and places as Tyre, Sidon, &c., the names of which are found in some of the earliest records of the human race.

South Africa.—In the Cape Colony Mr. Francis Skead has surveyed the entrance of the St. John River, or Umzivubu, on the south-east coast, and has begun a closer examination of Table Bay. But the further survey of the coast to the eastward is paralysed by the want of a land survey of the colony, notwithstanding that each year as it passes away proves more strongly than the last that this want bars the progress of the settlers, hinders the development of the revenues of the district, and is attended with loss to the colonial exchequer. No one knows this better than Mr. Maclear, the enlightened astronomer at the Cape Observatory, and every time he sends home a fresh sheet of the printed account of the remeasurement of Lacaille's arc of the meridian (which has now reached the 234th page) he expresses his regret at the want of foresight evinced in not going forward with this survey.

Red Sea.—The increasing demand for telegraphic communication with India has led to the despatch of a vessel to carry a line of soundings from Bab el Mandeb to Suez. Captain Pullen, R.N., of H.M.S. *Cyclops* (known to most of my hearers for his hardy boat expedition in the Arctic Sea from Point Barrow to the Mackenzie, in the

year 1849), was selected for this service. The ship being well fitted for deep sea sounding, a few deep casts were made in the Atlantic and in the Indian Ocean on the passage out. First the lead was dropped at the site of the *Devil* Rock, in the North Atlantic, which has been so often reported, and also at the *Hannah* Shoal, in 10° 7′ N. and 27° 32′ W., and no bottom found with 2000 fathoms of line: these two *vigias* then, as far as a radius of 50 miles each extends, are swept from our charts. In 4° 16′ N. and 28° 42′ W. bottom was got at 2100 fathoms. In 2° 42′ N. and 28° 44′ W. bottom was struck in 1080 fathoms; at 5 miles south of the Equator also 1080 fathoms; these two casts are respectively at 90 miles north and south of St. Paul's Isle. In 4° 16′ S. and 28° 42′ W. got bottom in 2100 fathoms; in 26° 46′ S. and 23° 52′ W. struck bottom in 2700 fathoms; this last sounding is important, as it is only 350 miles to the westward of a cast of 2426 fathoms, obtained by Captain Sir James Ross in the year 1839. In the Indian Ocean the casts obtained were 1400 and 1110 fathoms, near the supposed *Brunswick* and *Atalanta* Shoals, which do not exist; in 16½° S. and 59° E. got bottom with 1400 fathoms; in 5° 30′ S. and 61° 40′ E. bottom in 2254 fathoms, thus proving the non-existence of the *Rose*, *Galley*, *Swift*, and *Bridgewater* Shoals.

Ceylon.—Although no new surveys of this coast have recently been made, yet a valuable addition to the hydrography of this island arises from the publication at the Admiralty of two charts, on a scale of a quarter of an inch to the mile, extending from Colombo on the west, round the south coast, including the dangerous shoals named by the Portuguese the *Bassas*, and the east coast, comprising the rocks near Pigeon Island, off Trincomalee (where the *Ava* was recently wrecked), as far as Point Pedro. A new plan has also been compiled from various authorities of the harbour at Point de Galle. We do not know with whom it rests to make a complete survey of these coasts, but, whether it lie with H.M. Government or the East India Company, no time should be lost in setting it on foot, if we do not wish to hear of other losses in addition to that of the *Ava*, although it does not appear that that wreck was in any way the fault of the chart.

China.—In my last Anniversary Address I had the satisfaction of announcing to you that Captain Bate, R.N., the surveyor of Paláwan, was appointed to H.M.S. *Actæon*, for the examination of the coast of Tartary. Alas, how little do we know of the future! Hardly had he taken command of his ship, and prepared for his campaign, when

the assault on Canton was determined on. Foremost as usual at the post of danger, he volunteered for the hazardous task of selecting a site for the scaling-ladders of the storming party, and in doing so approached so near to the city walls that he was shot dead on the spot. Thus was lost to his country as zealous a surveyor, as gallant an officer, and as good a Christian as any in Her Majesty's service. He has left behind him in his works a monument more durable than brass. So long as the mariner's route to China lies along the coast of Paláwan, and that he can thread with safety that labyrinth of coral reefs that skirts its western shore, so long will the memory of this accomplished officer be held in esteem. In an unfinished letter to the Hydrographer to the Admiralty, found in his writing-desk after his death, Captain Bate says "he hopes soon to sail for the *Pratas*, at the south-eastern approach to the China Sea, to determine the best site for a light on that dangerous shoal, which has caused the wrecks of so many vessels." As the light on *Pedra Branca*, at the south-western entrance of the China Seas, is known by the name of HORSBURGH, whose Sailing Directory and Charts have long been the guide of the mariner in the East, so would it seem to be a fitting memorial to the gallant officer who has sacrificed his life in his country's cause, that the lighthouse, shortly to be erected on the *Pratas*, should be known by his name, and that the mariner, who, by a friendly beacon, is thus warned off that dangerous shoal, should be reminded of him whose last thought was for the sailor's benefit, and have cause to bless the name of THORNTON BATE.

Immediately after the capture of the city, our staff of surveyors under Lieutenant Bullock set to work, and have now completed a trigonometrical survey of Canton; and have finished what was formerly left undone of the chart of the Chu-Kiang, or River of Pearls, as far as Whampoa. They have also, under Mr. Frederick Kerr, made a track chart of the river to the west as far as Fatshan and Sam-shui.

Siam.—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards, Inskip, and Reed in the *Saracen* have again visited Bangkok, where, as before, they received every attention and assistance from the enlightened rulers of that country, the two Kings of Siam; they have completed a plan of the city and of the river Menam, which has been published at the Admiralty, and they have determined the position of most of the islands, as well as many of the headlands and capes on the

western, as well as on the eastern, shore of the gulf. A table of maritime positions, just printed at the Admiralty, and embodied in the latest edition of the chart of the gulf, will enable all map makers to correct the hitherto almost unknown outline of the coasts of that kingdom.

In *Australia*, a survey of Port Jackson has been made by the officers of H.M.S. *Herald*, and is in course of publication at the Admiralty; some additions also have been made to the approaches to Princess Royal Harbour. Here, and on Breaksea Island, lights have just been established as a guide to the anchorage for the Australian mail steamers, which at present all call at this port on their homeward voyage.

New Zealand.—Detailed coast charts of the entire circuit of this group of islands, the fruit of ten years' labour of Captains Stokes and Drury, with their zealous staff of assistants, on an uniform scale of 5 miles of longitude to an inch, or on an average scale of one mile to a quarter of an inch, 13 in number, are now engraved, as are also a complete series of the numerous ports and havens dotting the extensive sea-bord.

Those singular arms of the sea, forming a network of harbours on the south shore of Cook Strait, one of them Queen Charlotte Sound, famous as the chief place of resort of the circumnavigator Cook, are being engraved on a scale commensurate with their nautical importance, and on their completion, by the close of the present year, it may be considered that the hydrographic features of New Zealand are fully delineated.

In *Vancouver Island* and in the Straits of Juan de Fuca, Rosario, and the Haro Channel, a survey is in progress under Captain Richards, of H.M.S. *Plumper*, ably seconded by his staff of assistants, Messrs. Mayne, Bull, Pender, and Bedwell; the Bay of Semiahmu has been examined, and the site of the recently discovered gold mines fixed at some 50 miles up the river Frazer. On the Oregon coast two charts, for which we are indebted to the U.S. Coast Survey of this region, from Diego Bay to Vancouver Island, have been published at the Admiralty; and in the Gulf of California, Captain Harvey, in H. M. S. *Havannah*, zealously assisted by Mr. Hull, Master R.N., has rectified the positions of various points of that little known coast, which have been inserted in the charts.

In the *River Plate* Lieut. Sidney, R.N., has completed a plan of Buenos Ayres and its roadstead, which has been published; while

the results of the reconnaissance by Capt. Page, of the U.S. navy, in his ascent of the Paraguay and Paraná, published in America, have been immediately re-engraved and published at the Admiralty, in connexion with the former labours of Captain Sulivan, for the benefit of merchants and others desirous to open a trade with that rising and fertile country. New charts of Bahia and Rio de Janeiro, in Brazil, on a sufficiently large scale, from surveys by various naval officers, have also been recently published.

The position of that dangerous coral reef *As Rocas*, lying off Pernambuco, has been redetermined by Commander Selwyn, in H.M.S. *Siren*, and found to be in lat. 3° 51½′ s. and long. 33° 50′ w., just 100 miles from the Island of Fernando Noronha, which agrees very nearly with the position assigned to this islet by Lieut. S. P. Lee, of the U.S. navy. A beacon, 33 feet high, painted black and white, has been erected on the western island; and some cocoa-nut trees, planted in 1856 by Capt. Parish, are growing.

The attention of the astronomical world is just now greatly attracted towards this portion of South America, inasmuch as the total eclipse of the sun of Sept. 7 will be visible in that country. The path of the shadow of the eclipse, about 30 miles in width, will reach the continent on the Pacific side, a little to the southward of Payta in the state of Equador, in about 5° south lat., and curving in a S.E. direction across the interior of the country, will quit the coast near Santos, in Brazil, in lat. 25° s. nearly. Perhaps the best position for seeing it will be from the summits of the coast range of the Andes, near Payta, shortly after sunrise on the morning of the 7th of September. It is with much gratification that I am enabled to add that the Admiralty, in the interests of science, have placed a steamer at Rio de Janeiro at the disposal of any *bonâ fide* astronomer who may be disposed to observe this rare phenomenon on the coast of Brazil. On the shores of the Pacific such aid is not necessary, as the regular mail-steamer from Panama to Chile always touches at Payta.

West Indies.—In this archipelago of islands, perhaps the most important work during the past year is the publication at the Admiralty of a chart of the island of Cuba, in two sheets, on the scale of one-tenth of an inch to a nautic mile. It is compiled partly from the surveys of Captains Owen and Barnett, R.N., but principally from the Spanish charts, corrected by the maps of Pichardo and Coello. Lieut. Murray, in H.M.S. *Skipjack*, has also recently furnished some positions on the south coast. The above is only a

compilation, and confessedly imperfect; but there is little doubt but that it is far better than anything else that exists. It may be hoped that before long we may be enabled to improve it.

The survey of the island of Santa Cruz, by Messrs. Parsons and Dillon, is on the eve of publication, as is also a chart from St. Domingo eastward to Dominica, including Porto Rico.

United States.—Twelve sheets of charts and plans of harbours on the east coast of the United States of America, for which we are indebted to the admirable Coast Survey now so far advanced under Professor Bache, our medallist, have been published during the past year; they include the Delaware River, New York Bay, New London, and other places, the names of which, owing to the constant intercourse between the two nations, are familiar as household words.

Nova Scotia.—In the Bay of Fundy, Commander Shortland, with his staff, composed of Messrs. Scott, Pike, Scarnell, and Mourilyan, have surveyed the coast of New Brunswick from Quaco 25 miles easterly to St. Martin's Head, also from Cape Chiguecto to Cape Sharpe 25 miles, and from Port George to Cape Split, on the Nova Scotia territory, about 40 miles; they have also sounded over a space of about 300 square miles. Four sheets of the Bay of Fundy survey, on a scale of one inch to a mile, have been published during the past year.

On the eastern part of Nova Scotia and Cape Breton, Commander Orlebar, and his assistants Messrs. Hancock, Des Brisay, and Carey, have surveyed about 50 miles of sea and lake coast, including Great Bras d'Or, &c., sounding over 680 square miles. Two coast sheets and three plans of harbours, including Country Harbour, Whitehaven, and Miramichi Bay, have been published in the past year.

Variation Chart.—In continuation of the lines of equal magnetic variation, which have already appeared on the Atlantic, Indian, and Pacific Ocean charts, a Variation Chart of the World, to embrace this information so useful to the seaman and traveller, is being prepared for the present epoch by Mr. Fred. Evans, R.N., chief of the Compass Department at the Admiralty. It will comprise numerous observations recently made by various officers in H.M. navy, who have shown much assiduity in collecting materials. Of these we may especially mention an extended series made by Captain Richards and his assistants in the *Plumper*, on her voyage to Vancouver Island; by Mr. J. Loney, master of H.M.S. *Calcutta*,

on her voyage to India and China; by Captain Ryder, in the *Dauntless*, in the Mediterranean; by Captain Otter, in the Baltic, North Sea, and Hebrides; and generally by all officers engaged in the surveying service. These observations, after the variation chart of the world is published, will be printed, so that those interested may be enabled to examine the data on which the chart is founded.

Besides the works above enumerated as in progress in different parts of the world, the labours of the Hydrographic Office during the past year have consisted in the publication of upwards of 80 new or corrected charts of various coasts, and plans of harbours; of annual lighthouse lists for all countries, compiled by Commander Dunsterville, R.N.; of notices to mariners of new lights, or changes in them, prepared by Mr. G. Marsh, R.N., 1000 copies of which are weekly distributed; of tide tables, with daily predictions for 24 home ports, with the time and height of high water on full and change, for the chief places on the globe, computed by Mr. J. Burdwood, R.N., 1250 copies of which are distributed and sold; of various hydrographic notices of new rocks and shoals discovered, of maritime positions recently determined, all of which contribute materially to the benefit of navigation and the advancement of our knowledge of the physical geography of the globe.

Ordnance Survey.—During the last year the Ordnance Survey has been subjected, as I am informed by its able superintendent Colonel James, to another of those interruptions which for many years past have so marked its progress. In 1856 a committee of the House of Commons recommended that the series of plans which the National Survey should produce should, as respected Scotland, be—1. Plans of Towns on the $\frac{1}{500}$ scale, or 42 feet to an inch. 2. Plans of Parishes on the $\frac{1}{2500}$ scale, equal 25 inches to a mile, or 1 inch to 1 acre. 3. Plans of Counties on the scale of 6 inches to a mile. 4. Map of the Kingdom on the scale of 1 inch to 1 mile.

During the year 1856-7 that series was in the course of rapid production and publication, when the House of Commons decided that the larger plans were to be discontinued.

Seeing that by Colonel James's recent introduction of photography the plans on the larger scales can be so economically and rapidly reduced to the smaller scales, whilst the extra cost of plotting the survey on the 25 inch scale instead of the 6 inch is so trifling in amount, the last Government advised the appointment of a Royal Commission, composed of men eminent in science or public affairs,

to inquire into and report upon the whole question of the scales of the survey; the members of the Commission having been Lord Wrottesley, the Earl of Rosse, Lord Brougham, the Lord Justice General, Vice-Chancellor Turner, the Astronomer Royal, the Right Hon. E. Cardwell, Sir Richard Griffiths, General Cameron, Mr. Brunel, and Mr. Vignolles.

It is to be hoped that the Report of these Commissioners, whatever it may be, will be adopted by Parliament, and considered a final settlement of this long vexed question.

The progress of the survey during the last year has, I regret to say, been greatly retarded in consequence of the reduction in the amount of the grant to the extent of 30,000*l.*, and the necessary discharge of upwards of 1000 surveyors and draftsmen.

In England, however, the publication of the large plans of the county of Durham is nearly complete; those of Yorkshire and Lancashire having long since been published. The survey is now proceeding in Westmoreland, Northumberland, and Cumberland: a large portion of each of the two former is already drawn, and will be shortly published; and as the surveyors have now got through the great manufacturing towns and the populous mining districts, and have the more open country before them, a much more rapid progress may be confidently expected, and the completion of the survey of the northern counties may be soon anticipated.

In Scotland, with the exception of a small portion of Lanarkshire and Roxburghshire, the survey of the following counties is complete: Edinburgh, Haddington, Linlithgow, Renfrew, Ayr, Dumfries, Berwick, Selkirk, Fife, Kinross, Lanark, and Roxburgh; and the work is proceeding in Forfarshire, Perthshire, Stirlingshire, and Dumbartonshire. In fact, with the exception of the narrow strip of country along the eastern borders of Scotland to the north of Aberbrothick, the greater part of the cultivated districts of Scotland has been surveyed and drawn either on the large scale of 25 or that of 6 inches to a mile.

The plans on the 6 inch scale are now immediately reduced to the 1 inch scale, and engraved, and I still hope, therefore, to see, in my day, the greater part of our country represented on a map properly so called. Several of the sheets of England and Scotland have been published during the last year, copies of which are in the Society's Map Office; and I beg specially to direct the attention of the Members to the manner in which the features of the ground have been delineated on the Edinburgh sheet, and also

on the Yorkshire sheets. I have been indeed much gratified to learn, that the point for which I have long contended is to be carried out, and that the vast and uncultivated area of the Highland mountains of Scotland is to be represented, when published, on the 1 inch scale only.*

In Ireland, two thirds of the 1 inch map has already been engraved in outline, and more than one-third of the features of the ground has been sketched. The entire map in outline will probably be finished next year, and the engraving of the perfect map with the hill features is in progress.

British Publications.—At the head of the new geographical publications of our country I naturally place the new edition of the work on Physical Geography by Mrs. Somerville, which was last year announced as forthcoming. The varied phenomena of the physics of the globe are, as in the former edition, most logically and clearly put together by this gifted lady, whilst many new and important data are added; thus affording clear evidence that nothing has escaped her penetrating eye; her sound judgment and accomplishments enabling her to condense into a few lines passages descriptive of the great truths of nature. In short, for clearness of method, perspicuity of thought, and vast range of subjects, Mrs. Somerville's 'Physical Geography' must call for our warmest approbation.

The 'Letters from High Latitudes' by Lord Dufferin, which have appeared in the past year, constitute a volume of a very different character. The dashing and spirited manner in which my noble young friend sailed forth on his enterprise, and his gallant bearing when with his little *Foam* yacht he was so fortunate as to traverse icy seas, from which the *Reine Hortense* steamer, conveying Prince Napoleon, was obliged to turn back, the ardour with which he explored the lonely Isle of Jan Mayen, are all enhanced by the unaffected, captivating, and modest manner in which these feats are recorded. I rejoice, therefore, in the accession of Lord Dufferin to our body of working geographers.

Of Mr. Atkinson's remarkable labours in exploring such vast tracts of Eastern Siberia and Chinese Tartary I had occasion to speak at our last Anniversary, when we first saw his striking sketches and paintings. In the mean time, by the publication of an admirably illustrated volume, he has so far made us familiar with

* *See* Journal of Royal Geographical Society, 1852, vol. xxii. President's Address, p. xc.

countries of great sublimity and wildness, as to incite geographers and naturalists to encounter the many obstacles which our countryman overcame, and bring us back accurate details respecting regions of which we, as yet, know little more than the mere outlines.

Although connected incidentally only with our subject, a work has recently been published which it would ill become me not to notice. The brilliant orator and elegant scholar who has given us his thoughts on the writings of the greatest poet of antiquity, has well said that "To pass from the study of Homer to the ordinary business of the world, is to step out of a palace of enchantment into the cold gray light of a Polar day:" for, whilst we may doubtless plume ourselves on our present geographical knowledge, when compared with that of the author of the 'Odyssey,' as delineated in the map attached to the volumes of Mr. Gladstone, we are forced to admit that whilst the moderns have made great and useful discoveries, and have vastly extended the domain of science, Greece, small as was her territory, has left behind her examples of the sublime and heroic, which, whether they be read of in the philosophic pages of Grote, or in the eloquent passages of Gladstone, have scarcely, if ever, been equalled by any succeeding nation.*

Among practical consulting works and maps the following may be noticed. Blackie's Imperial Atlas has reached its twenty-seventh part, and is expected to be completed in the current year. It will then comprise a hundred separate maps, to which reference will be facilitated by an extensive index now in course of preparation. Mr. A. Keith Johnston has prepared a new General Atlas comprising a complete series of Modern Maps, of imperial size; five wall Maps of the present geography of Europe, Asia, Africa, America, and Australasia. Europe, the first of this series, is to be published immediately. Also a Geological Map of Scotland, by Professor James Nicol, which will be published in June, will contain a vast number of new data, as brought together by my distinguished geological associate.

An improved form of Fullarton's Gazetteer of the World in 1855 is now before the public. The Royal Atlas of Modern Geography has in its publication reached the 16th part, and will be completed in 22 parts. A recent map, showing at one view all the British possessions throughout the world, presents some features of novelty,

* 'Thoughts on the Study of Homer,' by the Right Hon. W. Gladstone, M.P. 1858.

particularly in the manner of overcoming the difficulty of representing so large a portion of the globe as one extended hemisphere, in the manner devised by Colonel James, R.E. The catalogue of the 'Literature of Geography' reaches to the completion of classified works on Africa. This collective view, furnished under the title of a 'Geographical Notice' by Dr. Norton Shaw, meets a great desideratum in the science. Of the numerous new maps or improved editions of older Surveys issued and prepared by our indefatigable associate, Arrowsmith, I will not now speak, as those who wish to study or possess such excellent works know that they have only to repair to Soho Square.

CONTINENTAL GEOGRAPHY.

Russia.—The great Russian Measurements of the Arcs of Meridian and Parallel.— The great Russian measurement of the arc of the meridian between the mouths of the Danube and the shores of the Polar Sea, to which I directed your attention in 1845, is fully described in the work by F. G. W. Struve,* my eminent associate of the Imperial Russian Academy, and superintendent of the observatory of Pulkowa.

The progress of this measurement, one of the grandest geodesical operations of modern times, I formerly noticed up to the year 1845, when explaining the operations in Livonia, Vilna, Finland, and up to Tornea, the point, it will be remembered, which was the southern termination of the measurement of the arc by Maupertuis.

In 1850 General Tenner had the satisfaction to push his triangulation as far as the banks of the Danube, and thus conclude his highly creditable labours of 34 years' duration.

As the former measurements of the arc of the meridian in Lapland, by Maupertuis, and afterwards by Svanberg, do not correspond with the requirements of the age, it naturally appeared desirable to extend the Russian operations through Sweden and Norway towards the North Cape. For this purpose Struve obtained the cooperation of the Swedish Government; and thus the whole of the arc of

* This work is entitled 'Arc du Méridien de 25° 20', entre le Danube et la Mer Glaciale, depuis 1816 jusqu'en 1855, sous la direction de C. de Tenner, Lieutenant-Général de l'État Major Impériale de Russie; N. H. Selander, Directeur de l'Observatoire Royal de Stockholm; Chr. Hansteen, Directeur du Département Géographique Royal de Norvège; F. G. W. Struve, Directeur de l'Observatoire Central Nicolas de Russie. Ouvrage composé sur les différents matériaux, et rédigé par F. G. W. Struve. Publié par l'Académie des Sciences de St. Petersbourg.'

meridian was extended to one of 25° 20′ 8″·2, reaching from Ismail on the Danube to Hammerfest on the northern shores of Europe. The length of this line, according to Struve's calculations, amounts to 1,447,786·78 toises. The chief meridian of the whole arc is that of Dörpat, which was accurately connected by chronometrical expeditions in 1854 with Pulkowa; the latter place having been previously connected by Struve in the years 1843 and 1844 with the observatory of Greenwich. The longitude of Dörpat Observatory thus obtained is $1^h\ 46^m\ 53^s{\cdot}53$ east of Greenwich.

One of the results of these operations is the very exact determination of a line of altitudes through Europe from South to North; and not the least striking fact among them is, that the Black Sea, the Baltic, and the Polar or North Atlantic Sea at Hammerfest, occupy exactly the same level.

Not less interesting is the Russian measurement of the arc of parallel or latitude extending from Bessarabia in the west, to the mouth of the Volga on the east. Of this work very little is known out of Russia; but the following reliable remarks have been furnished by Mr. Petermann, who obtained them from correspondents in that country. The mean parallel of these measurements is that of Züganesht, or 47° 30′ North latitude, extending from Bessarabia, west of the Dniestr, by Vosnezensk on the Bug; Ushkalka on the Dniepr to Melekhovsk on the Donetz; thence it turns more towards north-east, reaches the left bank of the Volga at Sarepta, and extends along that river as far as Astrakhan. The elevations of this line are of great interest: from Züganesht, which is 1004 feet above the sea, the ground gradually descends as far as the Dniepr, on which Snamenka has an altitude only of 223 feet. Between this point and Kuznetsow the country rises to 825 feet at Medwäd, and beyond Kuznetsow presents a general level of 400 to 560 feet, till at Sarepta it suddenly descends from 427 feet to 63 feet, which remarkable descent was already shown by myself and colleagues in our work on the Geology of Russia. The line of measurement along the Volga first descends *below* the level of the Black Sea at Prishivinsk. This work being in connexion on the west with the Trigonometrical Surveys of Austria, Prussia, and France, the determination of a very considerable arc of parallel between the Atlantic shores and the Caspian Sea is thus established.

Along with these operations may be mentioned the recent conclusion of a very important line of trigonometrical observations extending from Stavropol across the Caucasus to Tiflis, Bayazid,

and the Araxes; and another line from Astrakhan to the mouth of the Terek, Danaya-bashi, and the mouth of the Kur. A comparison of the altitudes of these two lines is curious; for while all points of the Astrakhan line, as far as the mouth of the Terek, are below the level of the ocean, the former line passes over the Elbrus, 18,604 feet, and the Great Ararat, 16,965 feet above the sea respectively.

Imperial Geographical Society of Russia.—Under the Presidency of the Grand Duke Constantine, the Vice-Presidency of that eminent navigator Admiral Lütke, and aided by the zeal and intelligence of its Secretary M. Lamansky, this Society is truly the centre of many of the best scientific explorations of Russia; whilst by its activity we can best measure the remarkable progress of geographical knowledge in this vast empire.

The most important of its recent labours is the exploration of Eastern Siberia, commenced in 1854, and to which I alluded last year. This great work is still in progress, and will probably be completed this year. The vast region beyond the Lake Baikal, and in particular the north-east angle formed by the course of the river Lena and its affluent the Vittim, being a country very slightly known, most attracted the attention of the members of the expedition; whilst other explorations were also extended to the south-eastern frontiers of Siberia, and particularly to the course of the great river Amur. By the arrangements for the survey of the Trans-Baikalian tract, M. Smiriaguin explored the valley of Vittim from its central part to the Lena; M. Ussoltzoff visited the valley of the Nertscha and the superior course of the Vittim; whilst the course of the Bargousine in Northern Angara and its affluents was to be traced by M. Orlof. The object of this expedition was not only to develop the physical geography of this region, but also to collect natural history products and ethnographical materials; the members of the expedition being directed to acquaint themselves as far as possible with the domestic life of the nomadic population, and with their means of subsistence and of communication. At the end of 1855 two of the members (Ussoltzoff and Orlof) returned to Irkutsk with successful results; but Smiriaguin, whose mission was the most important, was assassinated, and all his collections lost—a deplorable event, which deprived the expedition of some of its most important results. Again, it unfortunately happened that the destined successor of Smiriaguin, M. Sondhagen, died of apoplexy before his departure for Siberia. But, notwithstanding such untoward circumstances, some results of the expedition are very inter-

esting. Lieutenant Ussoltzoff presented to the Society the journal of his travels from the mouth of the Nertscha to the mouth of the Bargousine, embracing about 1500 versts. He determined the geographical situation of the principal points, and collected valuable information about the nomades of Olekma and Karenga.

Lieutenant Orlof also presented his itinerary, embracing about 2500 versts. It would be premature, says M. Lamansky in his memoir of 1856, to construct on these data alone a map of the valley of the Vittim, before the longitude of the river is determined. Nevertheless, if we compare the new sketch maps, prepared by the travellers, with the old maps, we observe some important changes. Thus, the sources of the Nertscha Yablonoi-Krebet were not ascertained before, and the neighbourhood of the Lake Baountof was totally unknown. It can now, however, be said that the geographical positions of all the principal points of the Trans-Baikalian district are determined.

Among these researches, the natural history descriptions and collections of M. Radde are fraught with deep interest. Commencing his observations in 1855, in the basin watered by the Lower and Upper Angara rivers, which fall into the Lake Baikal, M. Radde also explored the borders of that internal mass of water which are now rendered familiar to us by the striking paintings of Atkinson. The following year (1856) was entirely devoted to an examination of a region extending along the frontiers of China, from the Yablonoi mountains by the Argon river, a tributary of the great Amur. In this long tour he made zoological and botanical excursions into the elevated mountains of Tchokondo, the steppes of Abbagaitouy, the Lake of Torey, and the environs of the Dalai-Nor Lake.

In the tracts which surround the alpine Tchokondo, he observed that the vegetable products and animals occupied six distinct regions or terraces, from one of which, and at a height of 8200 feet, he collected many curious species of plants and rare animals. On the Lake Torey he watched the autumnal migration of the birds, and gathered the plants of a great adjacent saline steppe. Noting the periods of hybernation and reanimation of certain quadrupeds, M. Radde has further shown that, since the journey of Pallas in 1772, the herds of that remarkable animal the *Aegoceras Argoli* of the great naturalist, which then abounded in the mountains of Odon Tchalon, in Dahuria, have recently (1831) been entirely destroyed by a severe winter in the mountains of Soktui and Sehir, to which

they had migrated south-westwards; their skeletons now only remaining.

When the vast collection of animals and plants was gathered together and exhibited at Irkutsk, M. Selsky, who examined it, declared that, with the exception of Middendorf, Maksimovitch, and Schrenck, no traveller in Eastern Siberia had equalled M. Radde in the number and diversity of the objects collected; whilst the zoological and botanical maps which he has prepared in illustration of his researches may well be cited as proofs of his powers of generalization by enabling us to compare his data with those of Pallas, and thus measure the amount of change in the productions of nature which has taken place during the last 85 years in a region so little frequented by man, and where nature, untrammelled by artificial appliances, reigns supreme.*

The naval officers and astronomers of the expedition directed to the river Amur, determined the principal bends of the river, and most important results for natural history science were obtained by M. Maak and the other members of the expedition. By their combined labours the maps of the course of the Amur were prepared. All the materials for the natural history of the country were collected and presented to the Imperial Geographical Society by M. Maak, and are about to be published in St. Petersburg.

Both these great Russian explorations are still in progress, and a list of all the astronomical observations, both on the Amur and in the Trans-Baikalian province, is given in the Report of the Imperial Geographical Society of 1857. This list enumerates 115 points, principally along the banks of the Amur and its great affluents. All the most important places of this great river and its general configuration are, in short, made known, and these determinations will serve as solid bases for preparing the map which is to accompany the publication of the results of the exploration of the highly interesting basin of the Amur.

M. Semenoff, creditably known as the translator of the excellent work of Ritter into Russian, has been furnished by the Imperial Geographical Society with the means to explore the Russian Altai and the adjacent Kirghis deserts, already brought to the mind's eye of the British public by the paintings of Atkinson. The Russian work will thus acquire an originality of character by its copious additions.

* Bull. de la Soc. Imp. des Naturalistes de Moscou, 1857. No. 1, p. 296.

No scientific traveller (as M. Lamansky writes to me) had previously visited the Thian Chan and Alataou beyond the river Ili. Hence M. Semenoff, following the advice of Humboldt, with whom he corresponded on the importance of explorations in Central Asia, decided to try to penetrate into the Thian Chan and to the southern shores of the Lake Issi-kul. His enterprise was crowned by success. He penetrated without difficulty to the mountains Santache, between the Karkara (affluent of the river Ili) and the Tiub, which falls into the Lake Issi-kul. Thence he continued his way among the armed and turbulent tribes of Kirghis of Little Bukhara, then at war with the Chinese government, and pursued his travels to the East in the valleys of Djirgalan and of the Terek; this last forming the southern shore of the Lake Issi-kul. Before he reached the middle of that lake, the traveller turned abruptly to the south and advanced between the masses of rocky mountains of the Thian Chan through the transversal valley of Zaoukinsk. There, he found those alpine lakes, which, covered with ice even at the end of June, form the exterior or north-eastern limit of the fluvial system of the Syr-Daria. In another excursion to the south-east, from the Santache mountains, M. Semenoff penetrated through the lofty pass of Kosh-Djar, and reached the springs of Sarydjaz, whence flows the principal branch of the Oxus.

Other labours of the Imperial Geographical Society have consisted in the publication of the general as well as detailed topographical maps of the government of Tver. The pecuniary resources of the Society seem, however, to be insufficient for the publication of maps of other provinces which are already prepared.

The two last volumes of the Society's Memoirs (vols. xi. and xii.) contain the very valuable memoirs of Helmersen and Pacht, who have shown the intimate connexion between geological phenomena and physical geography in their explorations of Central Russia from the mouths of the Western Dwina to the Samara, accompanied by new geological maps.

Let me here say that the Imperial Geographical Society has also taken an interest in the expedition to the Caspian Sea, conducted by the distinguished naturalist and geographer Baer, who has published some instructive articles on the fisheries in this sea. Another memoir of Baer explains his views respecting the desiccation of the vastly larger Caspian of former periods. But sound as are all the natural history descriptions of my eminent associate, few geologists, I apprehend, will agree with him that the waters of the

great tract which Humboldt termed "Aralo-Caspian" once stood at the high levels of much of the steppe limestone, which is filled with Caspian shells; but will rather agree with myself and associates, that the great areas of land which surround the present Caspian, and which now separate that sea from the Aral, have been elevated into their present position from a former great interior depression on the earth's surface.

Lastly I may mention a fact, brought to my notice by Professor Katchenofsky of the University of Kharkoff, and now in London, that each University in Russia contributes more or less to geographical science. For example, the professors of natural history undertake every year the explorations of the adjacent districts, and publish their accounts and memoirs. Again, in the University of Kiev there was established some years ago a permanent commission for the description of Western Russia: its publications now form many volumes, and contain the most important materials for the geography, geology, statistics, and history of the governments of Kiev, and the adjacent provinces of ancient Poland.

Germany—Austria.—The Imperial Geographical Society of Vienna is steadily pursuing its useful career in bringing together information from other countries, and in stimulating and encouraging detailed researches which open out a knowledge of the interior of the empire or its coasts.

M. Haidinger has furnished me with good news respecting the successful voyage of the *Novara*, and has also sent to me the copy of a letter from Lieut. Maury to Dr. Scherzer, of that Austrian frigate, which contains so much of real interest to physical geographers, by throwing light on the currents and temperature of the sea, with good suggestions for nautical and physical inquiries, that I hope it will be published in the Proceedings of our Society.

The maps published and the geodetical operations executed in the last year by the Imperial Geographical Institute of Austria, under the direction of General A. von Fligely, are as follows:—Special Map of Bohemia, scale $\frac{1}{144000}$, sheets 2 and 14; Maps of various districts of Hungary, without the relief of the ground, scale $\frac{1}{288000}$; Map of the environs of Gloggnitz, including the railroad over the Semmering, the Schneeberg, and the Rax-Alpe, scale $\frac{1}{28800}$; a general Map of Hungary in 16½ sheets, scale $\frac{1}{288000}$, of which 4 sheets are published; whilst a general map of Wallachia is preparing in 6 sheets on the same scale.

In carrying out the triangulation of the Tyrol from Innspruck to the frontiers of Bavaria and to the territory of Salzburg, the engineers have determined the attraction exerted on the plummet by some of the mountains. In relation to one point in the middle of the valley of the Inn, and in approaching 530 Vienna toises towards the northern range of mountains, the deviation of the plumb line was 5″·7. In the opposite direction, or in nearing the more southern mountains, or the mass of the Tyrol, it was found that for the spaces traversed of 625 and 1333 toises, the corresponding deviations were 6″·2 and 10″ respectively.

The Austrian Navy have recently made extensive magnetical observations in the Mediterranean, some of the most important of which are due to Dr. Schaub, the Director of the Naval Observatory of Trieste, who has lately visited London.

Of other Austrian publications relating to our subject, the most important are a book on the general Geography of the Empire, by Dr. Schmidt and Professor Wachsmuth; Von Czörnig's comprehensive work on Austrian Ethnography, with a beautiful large map in 4 sheets; and Professor Franz Potter's work on Dalmatia, the most complete relating to that country which has yet appeared.

Other German Researches and Publications.—During the last vacation, when roaming through Germany, I did not fail to visit the well organized and thriving geographical establishment of Justus Perthès, of Gotha, and was much gratified in witnessing the ability with which it is conducted. I am indeed glad to inform you that the 'Mittheilungen,' of which I spoke so favourably last year, has now, as I am informed, a sale of 5000 copies per month—a fact highly creditable to the German public. Having long lamented that we are not sufficiently acquainted with researches relating to Germany, or works published by writers of that country respecting other lands, I requested Mr. Petermann, the intelligent editor of that useful periodical, to furnish me with some data, which I now lay before you.*

* Mr. Petermann has sent me most of the sheets of a Memoir about to appear in the 'Mittheilungen' on the Progress of the great National Maps and Topographical Labours of all European Countries, a highly useful work of reference. *See* also List of the "Principal Maps of Europe" in our own Map-room.

Among the works of general interest which have recently been published by Justus Perthès and Co., of Gotha, or are ready for publication, are the following (exclusive of the German edition of Dr. Barth's Travels):—Lieut. Van de Velde's large Map of Palestine, in 8 sheets, based on his surveys in 1851 and 1852, and other accessible materials. Along with this map is a comprehensive Memoir, with numerous tables of astronomical and hypsometrical observations, distances, and other data. In connexion with this map, Van de Velde and Dr. Titus Tobler have drawn a large Plan of Jerusalem, also accompanied by

During the past year several laborious investigations have been made to fix the exact altitude above the level of the sea of some central points of Germany, to serve as bases for a mass of hypsometrical data accumulated during many years, and also to set at rest the question of the levels of the Adriatic and Baltic seas. For example, Professor Bohm, director of the Observatory at Prague, has determined the altitude of that place above the Baltic at 99·37 toises, and above the Adriatic at 97·03 toises; the second part of his investigation, namely, that referring to the level of the Adriatic Sea, remaining, however, uncertain, whilst J. F. Julius Schmidt has fixed the height of the Observatory of Olmütz at 109·81 toises.

The Essay of Dr. Meyn on the Friederichs-Koog, an extensive piece of ground in Holstein, gained from the sea, is a notable addition to the history of the Coasts of the North Sea; and the most important works on Southern Europe are those of Professor W. Vischer on Greece in the year 1853, and of Professor J. Roth on Mount Vesuvius.

Of German travellers in Asiatic countries, Dr. Roth, to whom I alluded last year, must be specially mentioned; for his researches will throw much light on countries mentioned in the Sacred writings. One of his best results is his exploration of the Wady Akaba, the watershed or culminating point of which, between the Dead Sea and Red Sea, is ascertained to be at the salt-marsh Godiyán, about seven hours' travelling from Akaba, which is 113 English feet above the level of the Red Sea. Dr. Roth has also made interesting discoveries in natural history, and has noticed that the crocodile lives in the rivers Zerka and Difieh (32° 35′ N. lat.), a fact unobserved by former travellers. At present he is exploring the countries east of the Jordan.

a Memoir; both maps and memoirs being prepared and published in English, in consideration of the interest England takes in these countries, and also of the benefit accruing to their works from English researches. Another work, by F. H. von Kittlitz, 'Reminiscences (Denkwürdigkeiten) of a Voyage to Russian America, Kamtchatka, and Islands in the Pacific,' contains many observations on the zoology and physical geography of these regions. J. G. Mayr's Atlas of the Alps, containing the whole of Switzerland, is now published. This atlas comprises 9 sheets, and extends over all the chain of the Alps and its flanks, the author himself having, during many years, travelled over all this region. Another work relating to the Alps, by Professor Simony, of Vienna, represents in a series of landscape-pictures, highly finished and printed in colours, characteristic geological views of Alpine scenery. A Geological Atlas of Austria, by Franz Foetterle, in Vienna, is far advanced, and will soon be published. A Plan of Prague, and a Map of the surrounding Country, both by Professor Körislka, of Prague, are elaborately drawn and coloured on a system of contour lines, and are accompanied by a Memoir. A work on Earthquakes, in three vols., by Dr. Otto Volger, particularly on the Earthquakes of Switzerland, is nearly ready; whilst the Exploration of the Taurus, in Asia Minor, with Map and large Diagram of the Geographical Distribution of the Vegetation, is published by Kolsky, the botanist, who accompanied Russegger in his well-known travels.

Dr. Sandreczki has published an interesting work in three volumes of his journey to Mosul and Urumiyah; and H. Zollinger, many years resident in the East Indian Islands, has recently returned there and recommenced his labours, which formerly were mostly published in Logan's Journal of the Indian Archipelago.

Theodor von Heuglin's little work on a journey to Abyssinia, lately published at Gotha, and now in my possession, contains new matter on the western part of Abyssinia not visited by any other European. This author is the Austrian Consul in Khartum, and one of the most active and indefatigable travellers in Eastern Africa. A perusal of this work, so creditable to the enterprising traveller, particularly for the light which he throws on the zoology and botany of North-Eastern Africa, must be singularly gratifying to our countrymen; since the author describes and figures a very remarkable species of *Musa* of great size, with violet or purple coloured midribs of the leaves, which proves to be precisely the wonderful plant the *Ensete*, described by the great Abyssinian traveller Bruce.* This reproduction before the public of Europe of another of the many original observations of Bruce—observations which to the disgrace of our country were formerly to a great extent discredited—has, I am happy to say, received a still more complete confirmation whilst I write, by the growth of this very Musa Ensete to the height of 40 feet in the Royal Botanic Garden of Kew, by my friend Sir W. Hooker, who reared it from the seed sent to him by Mr. Walter Plowden, H.B.M. Consul at Massowah, Abyssinia, in 1853.

Mr. Petermann published last year in the 'Mittheilungen' a portion of the Diary of the extraordinary Hungarian traveller Ladislaus Magyar, of whom I spoke in the year 1853, and who has been residing for several years in Bihé, being married to a native princess. He has recently sent home a portion of his work and a detailed map of Benguela, intending to return to Europe in the course of this year and superintend the publication of this work, which is to appear in three volumes, with detailed maps.

A young savant, Albrecht Roscher, devoting himself to African studies, has produced a work on Ptolemy's Geography of Africa, in which he has attempted to show the correlation between the map of that geographer and the maps determined by the most

* Vol. vii. (8vo. ed., 1805), Appendix, p. 140, and Atlas, Pl. VIII. and IX. M. Heuglin makes no allusion to Bruce's description of the 'Ensete.' (*See* Hooker's Journal of Botany, No. XC., p. 210; also note on Abyssinia in the sequel.)

recent researches and discoveries. The principle of Mr. Roscher's interpretation is said to be novel and convincing.

Mr. A. Zurbold, of Leipzig, has brought out a Biography of the lamented Australian traveller, Dr. Leichhardt, and also collected and edited many detached papers and letters of that explorer.

Professor Heller, who has been travelling for several years in Central America and Mexico, has published accounts of the province of Tabasco, and of the region of Orizaba, with map. He makes the heights of the Pic of Orizaba 16,602 Fr. feet, and of the mountain Popocatepetl 16,650 Fr. feet above the sea. Professor Burmeister of Halle, so well known to geologists by his work on fossil crustaceans, &c., who previously travelled in the Brazils, has during the last year been exploring Uruguay, the Pampas, and other portions of South America. A work in two volumes by Julius Fröbel contains a description of his travels and experiences in North and Central America during the years 1849—1856. Though not professing to be a scientific work, it contains, I am assured, much new and interesting matter. Two well illustrated quarto volumes relating to the United States of North America, by Balduin von Möllhausen, have been published. This author, with Lieut. Whipple and Jules Marcou the well-known Swiss geologist, was employed in surveys and explorations connected with the projected railroads to the Pacific. The chief interest of this work, however, consists in its ethnography. An useful work on Chile has been published in French by V. Perez-Rosales, the Chilean Consul at Hamburg.

Cosmos.—Lastly, in mentioning the recently published works of German authors, let me dwell somewhat more on the 1st part of the 4th volume of the 'Cosmos' of the truly illustrious Humboldt.

On this occasion the author quits the consideration of the heavens, so luminously expounded in his former volumes, and treats exclusively of telluric phenomena. The part recently issued consists of two main divisions, in the first of which he treats of the magnitude, figure, density, and internal heat of the earth, as well as of its magnetism. He then pursues his grand fundamental plan; and maintaining the connecting links which unite all telluric phenomena and the representation of the concurrent action of forces in a single system, he devotes the second division to those terrestrial phenomena which are attributable to the reaction going forward from the interior upon the exterior of the planet, or, in other parlance, "volcanicity." This great class of physical agencies is most skilfully elaborated under the respective heads of earthquakes, thermal

springs, springs of vapour and gas (salses, mud volcanos, naphtha flames), and volcanos. The last are described under various heads, in each of which the direct connexion between the *modus operandi* (whether in geological and pre-historic times, or in the present period) and the geographical outlines of the earth is admirably sustained, both from the vast range of personal observation of the author, and from the citation of all those who have studied such works of nature. Although it is impossible to do more on this occasion than stimulate my hearers to read this most instructive volume, of which an excellent translation (with lucid annotations) has been produced by our associate General Sabine, I may specially call your attention to the sketch of the geographical distribution of volcanos. Humboldt estimates that out of 407 volcanos, 225 have been in activity in very modern times; and of these, 198, or $\frac{7}{8}$ths of the whole, lie within the great "Pacific Basin." One of the important generalizations which he is disposed to draw, from a consideration of their prevalent linear direction, is, that islands and coasts are richer in these outbursts, because, to use his own words, "The upheaval effected by internal elastic forces is accompanied by adjacent depression in the bed of the sea, so that an area of elevation borders on an area of depression, the limit between them exhibiting profound clefts and fissures."

After minutely examining the chemical and mineralogical characters of the rocks produced by volcanic action, and doing all justice to the new classification of volcanic rocks by M. Gustaf Rose, Humboldt concludes this volume by pointing out the importance and extent of the eruptions of molten matter through the great clefts or fissures above spoken of. "He has been led (he says) to entertain the conjecture that a not inconsiderable portion—perhaps, according to volume, the larger portion—of volcanic rocks have been emitted, not from elevated volcanic frameworks, but from a net-work of fissures, on the earth's surface, from which they have poured forth, often forming strata covering an extent of many square leagues."—(English Edition, Sabine, p. 448.)

In a conversation which I held with my venerable friend in Potsdam in September last, just as he was entering his 88th year, he explained to me some of these views with his accustomed clearness and freshness of description; and I then had the satisfaction to find, that in addition to the remarkable volume now issued, a second part would soon follow, in which all organic nature, from its earliest traces in sedimentary strata to the present day, will be exhibited in

harmonious correlation with the physical changes of the crust of our planet.

Switzerland.—To our praiseworthy correspondent, M. Ziegler of Winterthur, so well known for many beautiful maps of his native country, I am indebted for what we know of the progress of Geography in Switzerland. The geodetic and topographic surveys have been continued in the mountains on the north of the Canton of Tessin, and along that part of the chain of the Alps which includes the Cols of Lukmanier, the Little St. Bernard, and the Splugen. Detailed works have been executed in the environs of these passes, whilst triangulation is proceeding on the elevated points above Dissentis and the valley of the Vorder-Rhein.

The principal travels which have been executed during the past summer, were undertaken chiefly with a view to geological researches. Those of Dr. Heusser in the Valais were made in the vicinity of Visp—to observe the centre of a disturbance caused by alarming earthquakes, which have not yet entirely ceased. M. Heusser, being a Professor attached to the University of Zürich, has recorded his own remarks on the localities of those phenomena in a pamphlet* published by the Society of Natural History of Zürich. Chanoine Rion has also given an account of earthquakes experienced in 1855, from June to November.†

During the past winter meteorological observations were likewise made throughout all the extent of the central Alps; repeated luminous appearances having astonished the observers.

By reason of the uninterrupted advance of the works for railways in Switzerland, the number of exact hypsometric data is continually on the increase, and M. Ziegler will continue his communications relating to altitudes along these lines, and will also make us acquainted with the progress of each railway. The Polytechnic School publishes a journal‡ which may be called the scientific organ of that federal institute, and which will describe in detail every Swiss railroad.

Hypsometric charts have been multiplied; and as their utility augments in proportion as we become enabled to compare with accuracy the heights of different countries, M. Ziegler has transmitted to us an extract from a work which he is preparing for speedy

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* Das Erdbeben im Visperthal im Jahr 1855.
† Sion, 1855.
‡ Schweizerische Polytechnische Zeitschrift, 4to., Winterthur, 1856, pp. 12.

publication, and which will be noticed hereafter in our own publications.*

France.—Through the Report of the 'Bulletin de la Société de Géographie' of Paris by M. Alfred Maury, one of the Secretaries of that Society, we learn that the 20th part of the Map of France by the "Etat-Major," on the scale of $\frac{1}{80000}$, has been issued. The Dépôt de la Guerre has also completed a reduction of it in 16 sheets, and on the scale of $\frac{1}{320000}$.

The Survey of Algiers is in progress, on scales varying from $\frac{1}{200000}$ to $\frac{1}{800000}$.

Availing themselves of their leisure hours at Rome, the French officers have completed a Map of the South-Eastern part of the Papal Dominions on the scale of $\frac{1}{80000}$, to which has been adjoined a Plan of Rome and its environs on the scale of $\frac{1}{20000}$.

In the neighbourhood of the French possessions in Africa, the officers of the Etat-Major have compiled a Map of the Regency of Tunis, founded upon the observations of M. Falbe; and another, with the assistance of Capt. Baudouin, of the Empire of Marocco.

M. Linant, so well known by his earlier exploits, has produced a hydrographic chart of Egypt, and a map of Etbaye, the country inhabited by the Bichari Arabs.

In addition to the mention of the labours of the Dépôt de la Marine in the last year's Address, we have to thank that office for numerous charts since presented to us, whilst MM. Delamarche and Ploix have completed a line of soundings between Port Vendres in France and Algiers. The late M. Vincendon-Dumoulin, in company with the distinguished surveyor Capt. de Kerhallet, has published a work entitled 'Etudes sur le Détroit de Gibraltar;' and in the second edition of the 'Etudes sur les Ports de l'Algérie,' lately published, a series of excellent charts has been presented, the execution of which does credit to M. A. Lieussou. Lieutenant A. Boucarut has prepared the nautical documents for the Manual of the Navigation of the River Plata; and Capt. A. Legras has published an excellent work, entitled 'Description des Iles et des Passages compris entre la partie N. de l'Ile de Luçon et les Iles du Japon.' The work of our own Horsburgh on the Indian Seas, already rendered into French by Admiral le Predour, has received considerable additions from MM. Darondeau and Reille. From Captain Cloué we have a notice of the Sea of Azov, of which our associate

* Atlas hypsométrique, avec des éclaircissements.

Capt. Sherard Osborn gave us a description. In addition to the above, Capt. T. de Lapelin has made known his late surveys on the Pacific side of Central America.

On the west coast of Africa, France has taken possession of the territory of Dakar, opposite to Gorée; whilst Capt. Guillain has completed his work on the voyage of the *Duconëdic* to the east coasts of the same continent in 1846-7 and 8,—the portion relating to Guiledi, Zanzibar, Meurka, Mombás, and the languages of the tribes on the coast, being of particular interest.

Italy.—Little has been done for the advancement of geography in any one of the Italian States to the S. of Sardinia and the Austrian territory.

The trigonometrical survey of the kingdom of Naples for example, commenced under the late General Visconti, has progressed slowly of late years, the number of officers employed upon it not exceeding twelve at present, who are now occupied in laying down the frontier line with the Roman States. Of the great map of the kingdom, on a scale of $\frac{1}{50000}$, the three first sheets, including Gaeta and the neighbouring provinces, are on the point of being published. They are beautifully engraved, having the principal heights marked. The whole survey of the kingdom, and on the same scale, will consist of 68 sheets. The Topographical department is also now engaged in bringing out a general map of the kingdom, on a scale of $\frac{1}{800000}$, in four sheets. Commander Marzolla, of the same department, has of late years published a series of maps of the different provinces, chiefly derived from Zannoni's map, but with the roads more accurately laid down, and rectifications from the later military surveys of each province have been inserted, with detailed statistical data regarding the population, produotions, &c. Although indifferently lithographed, these maps will be found to be useful for the traveller, until the great trigonometrical map is completed.

AMERICA.

Arctic Regions.—A paper by the Danish author Dr. Henry Rink, M.D., has been read before our Society, commenting upon parts of the volume of the lamented Kane. One of the chief points on which he dissents from the opinions expressed in the work of the memorable American explorer is, that the Humboldt Glacier of the latter is not to be considered as the embouchure of the great fluvial icy system

which covers Greenland, but simply as being analogous to the other glaciers of that country, which he, Dr. Rink, had long studied, and on which he has written;—viz., separated masses, which, advancing from E. to W., launch or "calve" their bergs into a succession of fiords.*

The other subject on which the Danish observer is a critical opponent, is the northern extension of the map of Kane as derived from the hasty excursion of the ship-steward Morton. As this last point underwent an animated discussion, in which Sir G. Back, Captain Collinson, and Dr. Armstrong took part, I refer you to our forthcoming Proceedings for the conclusions at which they had arrived respecting the necessity of removing Washington Land some miles to the south, and will now only remark that not a word was said upon the occasion which could in any degree affect the noble and chivalrous character of Dr. Kane.†

Of the expedition sent out by Lady Franklin I have little to add to my last notice of its departure and arrival at Disco, nor is it probable that any other communication will be received until October. We have, however, the satisfaction of thinking that, under the experienced guidance of M'Clintock, our friends are at the present moment exploring that hitherto untouched land between Bellot Strait and the Arctic Magnetic Pole, whence they will follow up the steps of our missing countrymen; and though there are some who will not admit the existence of Peel Strait, and more who doubt the possibility of navigating it, there are yet to be found others who, considering how simply the bugbear of rounding Point Barrow has been dissi-

* *See* Journal Royal Geographical Society, vol. xxiii. p. 145.—ED.

† After these lines were penned, I received a copy of the 'New York Times' of May 6, in which it was announced that Dr. Hayes, the companion of Kane, had laid before the Scientific Association of New York a project for a voyage of exploration to the North Pole by proceeding beyond the limit of Kane's researches. This bold project is founded on the observations of Dr. Kane and the author, who noted that the growth of the plants, as well as the stature of the natives of their farthest north, together with the great northward migration of birds, were indications of a gradual decrease of cold towards the Pole. Hence it is inferred, that the broad zone of greatest cold, or that of 78° N., being once traversed by a plan indicated, the party would reach an open Polar sea, and a probable temperature of 66°. If the revival of the question of a Polynia should be followed up by an expedition sent out on such scientific grounds, we must truly thank our Transatlantic kinsmen for such a labour of geographical love.

Referring to the discussion which took place when Dr. Rink's memoir was read, let me here say that I have had great pleasure, whilst this Address was going through the press, in finding that Professor Bache had come to very nearly the same conclusion as Sir G. Back, Captain Collinson, and Mr. Arrowsmith. This result being communicated to the Society at our last meeting of this session, together with friendly explanations, must have convinced Mr. Poor, the representative of the Geographical Society of New York, who was present, that nothing had transpired on the part of our countrymen, in relation to the voyage of Kane, which exceeded the bounds of fair inquiry among men who were seeking out the truth.—*June* 25.

pated, are not without good hope, that to the glory of establishing the fate of our missing countrymen, will be added that of the circumnavigation of America. At all events we may rest assured, that with the certain prospect of a secure retreat in the event of reaching the American Continent, Captain M'Clintock will strive to the utmost to get southwards in his vessel; so that with an experienced commander, a well-found ship, and an able crew, whose energies are directed to a well-known point, we may, under Providence, look forward to a successful result. Still it is not without reason that we are desirous to open a communication with him, and a fine opportunity is afforded to any enterprising person, like the noble author of 'Letters from High Latitudes.' Wager River or Chesterfield Inlet might readily be reached this season by such a vessel as the *Foam*, and the intervening tract of land between the gulfs and the estuary of the Great Fish River crossed in time to secure a retreat before the winter. Here would be the excitement of danger so frequently courted, together with the certainty of sport both for the rod and gun, and the prospect of aiding in the elucidation of that great mystery which has occupied the attention of the civilised world for so long a period!

I cannot quit the theme of Arctic researches, upon which I have long thought with intense anxiety, and on which I have dwelt so much at length at former Anniversaries, without expressing my obligations to our associate Mr. John Brown for his work entitled 'The North-West Passage and the Search after Sir John Franklin,' which he has dedicated to the Royal Geographical Society and myself. In this volume the philanthropic author—at all times in the front rank of those who have sustained the search after our missing countrymen, and who has never given way to despondency—has placed before the reader an able epitome of all the efforts which have been made, as well as the theories which have been formed on this engrossing topic. On his own part, he adheres to the simple view, that the gallant Admiral has been encompassed and held fast by adhering literally to his instructions, and by seeking to force his way in a south-westerly direction from Beechey Island. Not re-entering into this vexed question, which it is hoped M'Clintock may set at rest, and on which so many experienced Arctic authorities have written, some of them believing that, if such was his ultimate fate, Franklin first essayed to force his way northwards and reach an open Polar sea, we must admire the warm-hearted earnestness with which Mr. Brown has

acquitted himself of his task, and has placed before us in a compact form the services of so many of our Arctic heroes.

North America.—British Possessions.—In the Address of last year I entered somewhat into the details of the expedition which, under Palliser and his associates Blakiston and Hector, upon the recommendation of the Council, had been despatched by Government to survey the water parting between the basins of the Missouri and Saskatchewan rivers, and to explore the edges of the Rocky Mountains within our own territories. Since then we have received, through the courtesy of the Colonial Office, several communications conveying the information that Capt. Palliser reached San Josef, an American town seven miles from the British frontier. The bend of the Pembina river near that place is within the American territory; but it has been carefully surveyed, as a large portion of the river flows through British ground. After visiting Turtle Ridge, the expedition reached Fort Ellice, at some distance from which, coal of fair quality was found, and afterwards reached the Qui Appelle Lake, on which is situated the most western station of the Hudson Bay Company's traders. Thence, the explorers started for the Saskatchewan, and in the course of their journey were for the first time compelled to carry fuel with them. The river was found to be navigable for large boats from the point reached, 109° longitude, to Red River. From Fort Carlton, his winter quarters, Captain Palliser proceeded to Fort Pelly, and subsequently to Chicago, Detroit, and Montreal. The paper notices the different Indian tribes met with, the character of the country, the swarms of buffaloes, and the wholesale and indiscriminate slaughter of them by the Indians, and describes the resources of the country, and its adaptability for agricultural purposes. Guides and a party of men had been engaged to assist in the projected operations, and in the summer Captain Palliser intended to start for the south branch of the Saskatchewan, through the country of the Black-foot Indians. From Lieut. Blakiston the Secretary has heard that he had completed and sent the map of the route to Captain Palliser for transmission to the Colonial Office.

The magnetic observations of Lieut. Blakiston and the geological researches of Dr. Hector, from whom I have received very satisfactory reports, will doubtless prove valuable, and may be alluded to with more effect at our next Anniversary.

On that occasion also I trust it may be in my power to report good progress on the part of the survey which, under the command of our Associate Lieut.-Col. Hawkins, has proceeded to co-operate

with the American surveyors and soldiers in defining accurately, and if possible by marked physical features, the boundary between the British possessions and those of the United States lying to the west of the tracts explored by Captain Palliser, and terminating in the Pacific to the south of Frazer River and Vancouver Island.

As this last survey is accompanied by a clever young geologist, M. Bauerman, brought up under my direction, and who is specially versed in mineralogy, I look with great interest to his report of the structure of these hitherto slightly-explored regions, the mountains of which, whether the Cascade range near the coast or the great Rocky Mountains farther in the interior, are simply the prolongations of the two chief chains of the western waterpartings of New Mexico, California, &c.

The natural obstacles to the progress of such a party were, it was well known, the dense forests they must penetrate; and to these I learn, whilst I write, is added the discovery, which might also have been well anticipated in the prolongation of the Californian ridges, of so much gold in the banks of the Frazer river * as already to have caused numerous emigrants to rush to these new diggings; a course which I fear the working men of the American and British surveying parties may be too much disposed to follow.

Canada.—Report of its Geological Survey.—The Geological Survey of Canada, under the direction of Sir William Logan, has issued elaborate Reports, in two volumes, for the years 1853-4-5 and 1856, copies of which have been presented to the Society. A great part of these Reports is necessarily taken up with geological subjects. The first by Sir William Logan gives an account of a large part of the Lawrentian formation, which runs from the coast of Labrador to Lake Superior, forming along a large part of its course an important mountain chain, chiefly formed of gneissic rocks, equivalent to the oldest gneiss of the north-west of Scotland and of the Scandinavian chain. Among these rocks, between Lake Huron and the River Saguenay, there are many bands of crystalline limestone. The gneiss proper yields but an indifferent soil, while that derived from the limestones is exceedingly fruitful; the result being that in the gneissic district almost all the farms have been established on sinuous lines of limestone, which, now partly cleared, often penetrate far into the interior of the forest-covered Lawrentian chain.

* *See* the Californian newspapers, &c.

The exploration of fresh countries like large tracts of Canada, or the new territories of the United States, offers continual illustrations of the dependence of geology on geography; for the geologist is often obliged to map the ground topographically while conducting his own labours. Canadian rivers and lakes previously unknown have been thus laid down with precision, and many merely indicated before have been reduced on a series of maps which occupy 22 large plates, filling a quarto volume. These surveys were conducted by Mr. Alexander Murray, and embrace a vast tract of country between the north and east shores of Lake Huron and the river Ottawa. This territory is traversed by the river Myanatawan, which runs westward through a chain of small lakes, and empties itself into Georgian Bay, Lake Huron. Again the Muskoka river passes in a winding course of about 150 miles through a series of lakes to Burnt Island Lake, about half way between Lake Huron and the Ottawa. Near this point the Petewahweh rises, and flows north and east, emptying itself into the Ottawa at Upper Allumette Lake. On the north shore of Lake Huron large rivers of the same character are now for the first time accurately mapped, called respectively Spanish River, White Fish River, and Wahnapitae River, which unites the lake of the latter name with French River, about ten miles from one of its mouths. This French River is of great geographical importance, uniting as it does by several channels the north shore of Georgian Bay of Lake Huron with Lake Nipissing, which is about 50 miles long by 20 in breadth. The eastern shore of Lake Nipissing is only a few miles distant from Upper Trout Lake, which, through the Mattawa river, communicates with the Ottawa in latitude 46° 18′ 12″. It is in contemplation by the Canadian Government, if practicable, to construct a ship canal through these rivers and Lake Nipissing, so as to unite the Ottawa and Lake Huron. This would shorten the distance from the east to Chicago by 600 miles.

In the year 1856, on the same survey, an exploration of the island of Anticosti, in the Gulf of St. Lawrence, was made by Mr. J. Richardson. This island is about 140 miles long by 35 in breadth, and consists partly of Lower Silurian rocks, but chiefly of a series of limestones called the Anticosti group by Sir William Logan, containing as they do a suite of fossils somewhat peculiar and intermediate in character between those most characteristic of the Lower and Upper Silurian rocks, like those of the British strata to which I have assigned the term Llandovery rocks. Mr. Richardson walked

round the island, which is quite uninhabited, except at the light-houses. The coast is intersected by numerous streams, and a great part of it has a belt of reefs dry at low water, the outer edge of which forms a cliff from 25 to 50 feet high, that evidently constituted an old coast line when the land stood relatively to the sea at a higher level than at present. The south side of the island is generally low, but on the north it rises in a succession of ridge-like elevations to a height of from 200 to 500 feet above the sea. The country is covered with wood, chiefly spruce, varying from 8 to 18 inches in diameter, and from 40 to 80 feet in length. Besides this, it is reputed to bear "pines," poplars, mountain ash, cranberries, a species of gooseberry-bush, red and black currants, strawberries, species of peas, &c. Potatoes have been cultivated successfully on the south side of the island, also Timothy grass and clover, and Mr. Richardson observes that he saw half an acre of barley 4 feet high with a strong straw and well-filled ear. The wild animals in the island are black bears, the red, black, and silver fox, and the marten.

Canada may, indeed, well be proud of this survey, the great explorations conducted under the direction of Sir William Logan having added almost as much to our knowledge of the topographical and natural history characteristics of the country as of its geological structure.

Central America.—Reserving for our next Anniversary an account of the progress of geographical knowledge in the United States, let me now call your attention to a commercial enterprise which seems to afford a valuable opportunity for the extension of our acquaintance with a region hitherto imperfectly known. Of few portions of the world within the bounds of civilization is our knowledge perhaps more circumscribed than of Central America. It is stated by a recent traveller (W. V. Wells, 'Explorations and Adventures in Honduras') that even as respects the leading towns the true position of but few is given with any accuracy. A Company composed of influential persons, at the head of whom is that liberal merchant-prince Mr. W. Brown, M.P. (who munificently bestowed a great free public library and school upon the town of Liverpool), is about to construct a railway across Honduras, to establish a commercial passage between the Atlantic and Pacific Oceans. For the last twelvemonths this Company has had a numerous staff of engineers upon the ground. Struck with the importance of the project (for the direct distance is only 160 miles,

and the railroad it is estimated will not have a greater length than 180 miles), Her Majesty's Government have sent out Colonel Stanton, an officer of the Royal Engineers, to inspect the survey, which is now completed. A chemical geologist and naturalist (Mr. Kirkpatrick) is also proceeding to Honduras to explore the mineral wealth and physical geography of the country, and the productions and quality of its soil. There will, therefore, not long remain any doubt respecting the capabilities of Honduras. Already we know from the work of Mr. E. G. Squier, that its harbours on both oceans, and its natural valley from sea to sea, intersecting the Cordilleras by the courses of the rivers Humaya and Goascoran, point out this tract as a great highway of commerce. In anticipation of the good results which are likely to follow from this effort of British capitalists and the suggestions of Mr. Squier, let me add that, out of near 60 persons hitherto employed during a year in a tract which has been considered insalubrious, not one death has occurred.

Through our active associate, Mr. John Power, of Panamá, we have received notices of various works in progress bearing upon the geography of these important but still very imperfectly mapped countries.

Dr. Wagener, the German traveller, was by the last accounts at Panamá, proposing to devote some time to an examination of the geography of the isthmus.

Of Guatemala an entirely new map is preparing for publication by Mr. Van Gehucht, a civil engineer, who has spent eight years on a trigonometrical survey of this state, in which he has determined by astronomical observation the true position of all the principal towns, as well as of the leading physical features of the country. Our correspondent, Mr. Power, has sent us a portion of the positions so determined, which will appear in the next volume of our Journal. To him we are also indebted for the translation of the first part of 'A Description of the State of San Salvador,' by Mr. Sommenster, an engineer who has been employed in making a new survey of it for the Government, which will shortly be published. Costa Rica has been partially surveyed by an English Company from Port Arenas, on the Pacific, to San José, the capital, a portion of the isthmus said to be now very incorrectly laid down.

Mr. F. M. Kelley, of New York, well known as the originator of the proposed great ship-canal across the Isthmus of Central America *vid* the Atrato river, has sent to us the interesting report

of Lieut. N. Michler, in charge of the topographical party sent by the United States Government to survey that part of the country. Lieut. Michler announces to the Navy Department, that he has completed his topographical survey across the Isthmus from the Gulf of Darien to the Pacific, along the line for the interoceanic canal proposed by Mr. Kelley. The practicability of the route, says Lieut. Michler, can only be determined upon after the necessary examination of the results of those labours.

South America.—On the river Meta, an important tributary of the Orinoco, steam vessels have been established by a Venezuelan company, whereby an opening has been made into the very heart of the country for the outlet of the products of the interior provinces of New Granada.

A new map of the State of Equador has been completed, after many years' labour and study, by Dr. Villavicencio, a native, who proposes carrying it to Paris himself for publication.

In Chile an exploratory expedition has crossed the Andes into the Indian territory south of Valdivia, to examine the lake of Nahuelhuapi, the site of an old settlement of the Jesuits, supposed to be the source of the great Rio Negro, which crosses the continent, and falls into the South Atlantic in latitude 41°; the details of which are promised to be sent to us.

The long pending dispute between Brazil and Paraguay relative to the opening of the upper waters of the river Paraguay has been recently settled by an amicable arrangement throwing open the navigation, in virtue of which the products of the rich province of Matto Grosso may now for the first time be exported by water-carriage, and we may look perhaps for some new data regarding a vast region very little known to Europeans.*

ASIA.

Syria.—Pushing onward to the east and south in the Pashalik of Damascus, beyond the explorations of Seetzen, Burckhardt, Lindsay, Porter, and all previous travellers, Mr. Cyril Graham has, through the good will of that singular people the Druses, contrived to visit the very remarkable tracts to the east and south of the Hauran,

* The reader who may wish to obtain more knowledge on the subject of the various parts of America than I here allude to must also consult the works thereon by German authors.—*See ante*, p. 285.

called es-Safáh, el-Hárrah, and the whole eastern borders of the Jebel ed Druz. He has given us, in short, a most able and animated sketch of a region which, occupied successively in olden times by powerful and civilized races, is now a desert, over which wandering and predatory Arabs, almost alone, hold sway. The es-Safáh is a highly-broken basaltic district, which extends to the N.N.W. into a chain above 30 miles in length, not marked on any map. The el-Hárrah, on the contrary, is a broad lower zone of loose basaltic fragments, forming the western belt of the broad rich plain lying between the Hauran mountains and the river Euphrates. After a description of the physical geography of this long forgotten region, the author describes the position of numerous cities scattered over the desert to the east and south of the Hauran, which, though wholly uninhabited, and for the most part roofless, are in many respects as perfect as when the olden people lived in them. Agreeing with Porter, that the Hauran must be the ancient Bashan of Scripture, Mr. Cyril Graham believes that the towns lying to the east of it, and which he discovered, are of a still older date, and were probably the work of the first Hamite emigrants from Shinar. He also collected very curious inscriptions in an unknown character, which have not yet been deciphered.

In reviewing the adventurous and successful travels of Mr. Graham, of which we shall soon have a detailed account in our Journal, we painfully recognise the fact, that a once highly cultivated, richly wooded, and densely peopled country, which after the times of Holy Writ was successively occupied by Greeks, Romans, Christians, and Saracens, has been reduced to a desert, supporting only a few nomadic tribes of Arabs.

The desiccation of the country may in great part be attributed to the destruction of once stately groves of lofty trees, which attracted the clouds and moisture, as well as to the demolition of those great reservoirs of water which the ancients constructed; but we are forced to the conclusion, that the main cause of this wide-spread sterility is the misrule of ages, and the inability of the Turkish Government to protect any industrious and settled inhabitants from the incursions of lawless Arabs. In the mean time it is refreshing to know from Mr. Graham, that the persevering Druses, to whom he was so much indebted (and who now supply the indolent inhabitants of Damascus with nearly all their corn), are extending agriculture, with muskets over their ploughs, into the richest spots of this *terra incognita*, and are thus explaining to us how such lands may in

ancient times have fed and supported the people who dwelt in the vast number of deserted cities.

Intlia—Himalaya, Karakorum, and Kuen Luen chains.—Résumé of British Labours in India.—At our last Anniversary one of our Gold Medals was justly bestowed upon Colonel Waugh for surveying and laying down on maps a vast area of the Peninsula of India, and for determining that the Himalayan range, the loftiest mountains in the world, reached their culminating point in Mount Everest at the height of 29,002 feet, considerably to the west of the point hitherto supposed to be their summit. On the same occasion I spoke to you of the recent travels of the three brothers Schlagintweit, particularly in Upper India, and the mountains to the north of it.

Unhappily there is too much reason to believe, according to native report, that Adolphe Schlagintweit, who was left exploring in the countries beyond Ladak, and far to the north in the direction of Yarkand, and from whom no letters have been received for more than a year, has fallen in an action with the Chinèse, in their war against the people of Turkistan; the fruits of his enterprise being, it is feared, lost. As, however, the reports of the natives proved unreliable in the case of our excellent explorer Moorcroft, let us hope that Adolphe Schlagintweit may still be spared to bring home to us some knowledge of the Yarkand territory.

The other brothers, Hermann and Robert, have now deposited at the India House their manuscript observations, numbering 43 large volumes, accompanied by maps indicating the distribution of their 88 magnetic stations, numerous meteorological observations, including all those which they obtained from various officers of the Company, and the localities where their plants were collected.

A considerable portion of their collection has indeed been already set up in the Museum of the India House, including transverse sections of trees, and facial casts of the people among whom they travelled, which, being taken from the living person of races little known, must be of value in ethnographical science.

Geographers must desire to see the results of these labours published, not only as relates to terrestrial physics and magnetism, but specially by the production of a map, on which shall be laid down the northernmost of those explorations of which, on the authority of Humboldt, I spoke last year, and to which I now revert: for it is indeed unquestionable, that the Schlagintweits did proceed farther to the north and by east, in the meridian of Ladak, than any other European traveller.

As a resultant of the numerous surveys and travels of our countrymen who have explored northwards from Hindostan, I may remind you that the gigantic peaks which enclose the lofty plateau of Tibet, and separate India from Turkistan, have generally been considered by British geographers to constitute one vast mass, or sea of mountains.* They were indeed so spoken of when I had the honour of delivering our Gold Medal to Henry Strachey, one of the best surveyors of large parts of this rugged region. Concentrated upon the west, in a knot or group, at and around the Hindu Kush, these mountains expand thence to the east and south in fan shape, their southern portion, the Himalaya, being the loftiest elevations in the world, and forming the northern boundary of India. Farther to the north, and beyond the plateau of Tibet, comes another band of parallel altitudes, which, also proceeding south-eastwards from the lofty western knot, is known near that meridian as the Múztagh, and acquires, a little farther to the east, the synonym of Karakorum. This last range, which, still farther to the east, is the Kailas of British topographers (adopted from the Hindú mythology), has for some years been marked on maps as the watershed of the mountain region which separates the drainage of India from that of Turkistan and China.† It throws off to the south the Indus, Sutlej, and Brahmaputra; the two first, after wandering westwards, and the last eastwards, in the plateau of Tibet, escape southwards through gorges of the mighty Himálaya, whilst to the north it sends off minor streams, the western ones of which, from whatever authority derived, have been for some years laid down on maps as descending from these mountains into the north-western low country of Yarkand.‡

In alluding to this axis or waterparting, it is a fact that it has not been traversed by any European proceeding northwards from India, though I specially invited your attention to that adventurous journey of Dr. Thomson when he ascended to the summit of the Karakorum

* *See* Phys. Geography—Western Tibet; Journ. R. Geograph. Soc., vol. xxiii. p. 1.

† Called "Thsoung-Ling" mountains in St. Martin's map, accompanying Julien's Travels of Hiuen-Thsang.

‡ *See* Map accompanying Hügel's 'Travels in Kashmir,' prepared by Walker (small general part thereof), and Arrowsmith's General Map of Asia, 1841; also the Map accompanying the Travels of Moorcroft and Trebeck, published 1841—some of the materials for the northward drainage from the Karakorum having been doubtless those collected by Mir Izzet Ullah, the remarkable servant and *avant-courier* of Moorcroft, whose travels beyond the Himálaya, through Tibet to Yarkand, and thence by Samarcand to Bokhara, &c., were translated from the Hindu by Professor H. Wilson in the Calcutta Oriental Quarterly Magazine of 1825, and republished by the Royal Asiatic Society.

pass. The same chain was, however, passed over in its far eastern prolongation by those very remarkable missionaries Huc and Gabet, though, unfortunately, they have given us no materials by which we can define its orographical features.

Now, the feat of the brothers Schlagintweit, of which I partially spoke last year, was, that leaving the Karakorum to the south, they traversed a diversified and broken plateau of about 16,500 feet average above the sea, and of about 100 miles in breadth from south to north, when, reaching a depression extending from west to east, they found between it and the low country of Khotan, another parallel east and west range, one of the heights of which they determined to be from 19,000 to 20,000 feet above the sea.* According to these travellers, this is the Kuen Luen (a Chinese name) of Klaproth and Humboldt, and is so called by the natives. Leaving these mountains, and descending to Elchi or Iltchi, the Khotan of Marco Polo, in the lower country of Turkistan, they were unable to reach Yarkand, and then returned to Ladak by another route, or that which leads from the former to the latter place. The rivers which they mention as separately flowing northwards, and which they have personally examined, are those of Khotan, Karakash, Yurongkash, and Keria, two of which were engraved in Arrowsmith's map of Asia (1841), from a large Chinese map at the India House, brought home by Colonel Reeve.

I here, however, repeat what I stated last year; viz., that the Schlagintweits are the only geographers who have visited those localities. They sustain, in fact, the view of Humboldt, and affirm that his Kuen Luen presents all the characters, relations, and altitude of an independent chain, as laid down by that great geographer in his 'Asie Centrale.'†

In anticipation, then, of the publication of such maps as their very arduous and difficult journey enabled them to make (they being disguised as natives), let us willingly accord to these brothers (one of whom has, I fear, paid the penalty of his life for adventuring too far into those wild tracts) the merit of having penetrated so far northwards as Khotan. Let me add that their drawings and paintings—particularly those of some of the great glaciers—are most striking and effective.

* Mir Izzet Ullah makes the distance from the north face of the Karakorum to Yarkand between 120 and 130 hours of march, which he accomplished in a caravan in seventeen days.

† *See* Humboldt's 'Asie Centrale,' 3 vols. and Map. 1843.

In alluding, however, last year to other labours of these gentlemen, I much regret to have unwittingly attributed to them geographical results in the Kumaon territory which it is well known were mainly accomplished, more than thirty years ago, by the very able British officers of the Trigonometrical Survey of India; viz. Captains Webb, Hodgson, and Herbert.*

In that survey, those officers measured the altitudes of such a number of peaks averaging upwards of 20,000 feet, that references were made to them by numbers instead of by printed names, among which the No. 14, which is the Nundi-Devi of my last year's Address, was separately measured by Hodgson and Webb, the former placing it at 25,749, the latter at 25,669 feet—a striking proof of the concurrence of the independent labours of these hard-working and excellent geographers.

Again, the glaciers of the river Pindur are laid down in the same map, and Capt. R. Strachey, Col. Madden, and other British officers have carefully examined these glaciers since that time. In fact, the orography of the mountains between the Kalee and the Sutlej, including Kumaon, has long been known; though the Schlagintweits made some interesting additions to the physics and the pictorial delineation of these tracts.

Nothing could be farther from my thoughts than not to sustain the hard-won laurels of the many British subjects who have earned great scientific reputation in the Trans-Himalayan regions; and no one who has perused the 'Asie Centrale' of Humboldt † can doubt that he has striven to do honour to our Moorcroft and Trebeck, the brothers Gerard, and all our earlier explorers, whilst in subsequent

* *See* Sheet 66 of the Great Map of the Trigonometrical Survey of India, issued by Horsburgh, 1827. I have the more been called upon to correct this *erratum* in my preceding Address, and to register the antecedent labours of some of the many British geographers and engineers, in consequence of a document presented by the MM. Schlagintweit (in September last) to the East India Company, in which they specify all their intended publications, without referring to the labours of their numerous predecessors in the regions through which they travelled. This document, which was not intended for publication, unluckily found its way into a periodical, and naturally gave umbrage to those who thought that numerous observations of our countrymen were slighted. In justice, however, to MM. Schlagintweit, I must state that they have assured me of their having always intended to enumerate the labours of their predecessors, as well as to refer gratefully to all those persons who kindly aided them; and they claim to be not judged by a mere MS. announcement of *their own* researches.

† I speak only of what Europeans have done in the region under discussion; for besides what was done by Moorcroft's man, Mir Izzet Ullah (*see* p. 301), Major Cunningham has shown, in the Asiatic Journal of Bengal, that as early as the year A.D. 414 the Chinese traveller Fahia explored some of these mountainous regions; and in his translation of Hiuen-Thsang's Travels in India during the seventh century, M. Julien also mentions the knowledge which the Chinese had acquired of this country.

works, including those with which I have myself been connected, such as the volumes of the Geological and Geographical Societies, there has surely been no remissness in acknowledging the highly-important and original labours of several of these remarkable men.

For my humble part in bearing testimony to the deserts of my countrymen, I refer you to several of my Anniversary Addresses, but particularly to that of 1852, when, after presenting the Gold Medal to Henry Strachey for his arduous services in completing a map of Western Tibet, I specially spoke of the successful explorations by my countrymen of "that part of Asia to which, as Englishmen, we attach deep interest, as constituting the northern frontier of our Indian possessions, which geographers revere as the loftiest region of the earth, and which it has been the ambition of Humboldt through life to visit in person."

Nor need we go far back in scientific history to note that one of the greatest additions to the science of physical geography was made by our countrymen Hodgson, Herbert, Colebrooke, and others, who, despite the incredulity of European philosophers of mark, demonstrated that the Himálaya mountains were the loftiest in the world!

In here reverting to a few only of these men, let me remind you, that whilst Henry Strachey received our Gold Medal, his brother Richard justly obtained the admiration of geologists for his clear and faithful description of so large a range of the region on both sides of the Himálaya, including the territory of Kumaon. Most assuredly I never could be oblivious of the services of the man who had been the first to demonstrate the existence of Silurian rocks near the Himálayan axis! * I further endeavoured to bring to your mind's eye the researches, in regions never before visited by European naturalists, of Joseph Hooker in Eastern Tibet, and of Thomson in Western Tibet,† researches so well conducted in many branches of natural history, and particularly of botany, as to have won for them the admiration of all enlightened men.

Again, did not geologists and geographers, with whom I have been acting, long ago recognise with gratitude the real merits of our Indian explorers, Cautley and Falconer, when they put forth their remarkable description of the wondrous fossils of the Sewalik hills?—researches all the more striking and praiseworthy, since the authors not only defined a new range of elevations as

* Quart. Journ. Geol. Soc., vol. vii. p. 292, and vol. x. p. 249.
† Royal Geog. Soc., vol. xxii., President's Address.

perfectly separated from the Himálayan chain, but, when far distant from all the means and appliances of Europe, actually described forms of extinct vertebrata never before brought to light, and assigned to them their true places in the animal kingdom.

In mentioning the name of Falconer, I cannot but regret that a large portion of the researches of my valued friend have never been laid before the public. Thus, I have ascertained that in 1838 he crossed the mountains of Iskardo, and followed up one of the sources of the Indus by the valley of the river Braldo to about 36° N. latitude, on to the glaciers which hang upon the southern face of the Muztagh or Karakorum, afterwards explored by Thomson, and which there separate the great steppes of Tartary, and the affluents of the Oxus, from the drainage of the Indus. Assisting in measuring a base line in Cashmir, in company with the late Colonel Mackeson, he amassed a large collection of plants from the Muztagh range, Western Tibet, and Cashmir, Lower Affghanistan, the Salt Range, and the Punjab, which valuable accumulations are at length being examined at Kew, under the direction of Sir William Hooker and his son.

Such labours as these, and many unregistered data, deserve to be accurately chronicled among the feats of our exploring countrymen in India, as well as the labours of Jacquemont, Hügel, Vigne, Winterbottom, and others, which have been noticed in our Journal, and are well known to geographical readers.

But here let me observe, that the writer who would bring together the numerous observations of all observers and travellers in various parts of India, which are scattered through a variety of periodicals, would render immense service to science. Many of these labours, as far as they relate to botany, geography, and geology, including those of my lamented friend the adventurous Burnes, have been frequently brought under your notice, whilst those of the distinguished botanist Royle have been feelingly adverted to by my contemporaries in mourning over the recent death of that eminent man.

In relation to geology, many of you are well aware that much light has been successively thrown upon the sister science by the labours of a host of observers, besides those I have alluded to, in various parts of Hindostan, among whom the names of Sykes, Franklin, Malcolmson, Christie, Newbold, Vicary, Fleming, Carter, Buist, &c., are honourably enrolled.

Let me also add, that I entertain a most sanguine hope that, with the re-establishment of order, the geological survey of India

will, under the direction of Professor Oldham, be brought into a condition of great usefulness to the empire, whilst under his able guidance it cannot fail to evolve results of great interest to pure geological science, some of which are indeed already foreshadowed in materials forwarded by him, which are now under consideration in this country. Although it is not my province to dilate on geological subjects, it gives me real pleasure to state that, as Governor-General of India, Lord Canning has taken a warm interest in the promotion of geological science, both by the enlargement of the Geological Survey formed during the Government of Lord Dalhousie, and by the addition of a School of Mines, thus testifying his sense of the necessity of opening out effectively the mineral resources of the Indian empire.

China.—The political arrangements which are pending will, it is hoped, result in the opening out of this vast empire, and in obtaining for us a much better acquaintance with the geography of its interior than we now possess. It is possible, though not probable (considering the suspicious character of the Manchu, or reigning dynasty), that the negotiations of our Government may result in the residence of a British minister at Pekin, and, if so, a field for geographical investigation will be opened in Northern China, a region hitherto little visited by any Europeans except the Russians, and in early times by the Jesuits. But if this effort should not be successful, the mere laying open to the enterprise of our merchants, of the great river Yang-tsze-kiang, which waters the vast plain, in the centre of which lies the ancient capital Nankin, will obtain for us an acquaintance with the chief interior parts of China. It will, in a word, give us access not only to the town of Han-Kow, perhaps the largest mart for commerce in Eastern Asia, which, situated 500 miles from the coast, is accessible to ocean steamers, but also to all the sites of mineral wealth.

The importance of this river as the high road into Central China was recently pointed out to the Society in a memoir, equally instructive and judicious, by our associate, Mr. W. Lockhart, who had resided many years in the country as a medical missionary. According to this experienced writer, and the concurrent testimony of Mr. Consul Alcock, as well as of several naval officers, most signal advantages must follow from opening out this great water-course, which would bring Europeans into immediate commercial connection with the one hundred millions of people who inhabit its fertile banks and those of its affluents.

A remarkable circumstance connected with physical geography, to which Mr. Lockhart directed our notice, and one that will doubtless attract great attention, is the change which has taken place in the course of the Hwang-ho, or Yellow River to the sea. Instead of flowing to the south of Shantung, as formerly, this mighty stream has shifted its embouchure to the north of that promontory, falling into the gulf of Pïh-che-le, 200 miles from its former mouth! This is one of the many proofs of the decline of vigorous government in China. In earlier periods the embankments of the rivers were carefully watched and repaired; but neglect has led to the breaking down of all artificial ramparts, and vast fertile tracts have consequently been sterilized.

Although unacquainted with scientific geography, and the relations between astronomy and geography, the Chinese possess, it appears, remarkable geographical and statistical accounts of the whole empire. A work called the Ta-tsing-yïh-tung-che, one of many similar publications, enters minutely into the topography, locality, and limits of every province, city, town, village, and hamlet in the empire, and gives the minutest details regarding thepopulation, products, commerce, and characteristics of the different places described.

Of all the recent donations made to our Library, no one has more gratified me than the offering of Mr. Lockhart, of the Te-le-tseuen-che, or a compendium of elementary geographical science, in two volumes in the Chinese language, as prepared by his associate, the Rev. W. Muirhead, and published at the expense of the late Mr. L. Dent, an English merchant. Translating the works of our most popular authors, and illustrating them with maps, diagrams, and drawings of animals, our good countrymen who have already issued two volumes,—one on political, the other on physical geography,—have thus taken the best method of breaking down the barriers which have so long separated us from this peculiar but most intelligent, ingenious, and laborious race.

Had it not been for the present troubles in China, much would have been accomplished in the survey of the coasts of Tartary and Japan. For that purpose H.M.S. *Actæon*, under the command of that deeply-lamented officer the late Captain Bate, was despatched from England last year, but having been detained before Canton, the object of her voyage was postponed. Besides the knowledge of the course of the great rivers, we have yet to obtain an acquaintance with the northern coast-line to the gulf of Pïh-che-le and Leaou Tung, as also with the whole of the coast of Corea.

The Russians, as already stated, have long had intercourse with the northern provinces of China; in fact, their overland commerce with the Chinese is of far greater antiquity than our maritime trade with this people. Russia has also had, for many years, a religious establishment at Pekin, which she has enriched of late by attaching to it various men of science, whether miners, geologists, or astronomers. Of the former, Major Kovanko, of the Imperial School of Mines, long ago published an account of the coal produce of the environs of Pekin. M. Constantine Skatschkof, who has resided nearly eight years at Pekin, as Director of the Russian Observatory there, and who, having recently returned to Europe, has just visited London, informs me that he has also prepared an account of those rich coal fields. Though not professing to be a geologist, this accomplished gentleman, having inspected the fossils of the Museum of Practical Geology, had no hesitation in recognizing among our British types, Silurian Graptolites and Orthoceratites, with Devonian Spirifers and Carboniferous Producti, as being forms which he had seen around Pekin.

As a large collection of these remains will be brought to Petersburg next year by M. Vasilefsky, the medical officer of the Russian Mission, we shall know precisely the extent to which the same fossils extended from Britain to China in the palæozoic times. Already, indeed, we may feel pretty certain that such a diffusion of similar types prevailed; for Mr. Lockhart has furnished me with fossil shells from the interior province of Sze-chuen, which are identical with species of Devonshire and the Boullonais.

Possessing these palæozoic rocks, with many ores and metals, and vast and rich coal fields, the empire of China, with its rich products of the soil, lies before us as a wondrous mine of wealth and lucrative commerce, which when opened out to Europeans may operate greater changes in our international relations than all the gold of California and Australia.

From the knowledge we have already obtained of the central and southern parts of China, it would seem pretty certain that we have attached too great an importance to the territory around Canton, which is cut off from the vast central and most populous portion of the empire, watered by the Yang-tsze-kiang, by a chain of mountains at no long distance from the seabord. Hence the rivers which flow from that ridge to the south, being short and small, are valueless as highways for commerce, when compared with the great central stream which flows from east to west for a distance of 3000 miles.

Though this is no place for political digressions, I must be forgiven if I make public a fact which has come to my knowledge from two reliable and independent sources respecting a Chinese public character, the Mandarin Yeh. Looking to the rigour and apparent wholesale cruelty of his measures when governor of the province of Canton, the English public have been led to regard him as a monster of cruelty. I am, however, assured, by both Mr. W. Lockhart and M. Skatschkof, that Yeh simply carried out the orders of his Government, which shows no mercy to rebels;—the latter, indeed, having spared none of the Imperialists, including a number of Yeh's relations. On the other hand, my informants affirm that Yeh is an example of virtue in China; inasmuch as though he might have become very rich at the expense of the natives, who are usually oppressed by the Mandarins, he is a poor man—further, it is stated that he is a very learned person, who, owing all his advancement to his superior knowledge, has larger and more enlightened views of government than most of the leading men in China.

Chinese emigration appears indeed to increase from year to year, and, in regard to our own possessions in the Indian Islands and Australia, we can already reckon about 150,000 Chinese settlers or subjects. Again, our imports of the two Chinese commodities, viz. tea and silk, amounted, during the last year, in value to twelve millions, whilst the two articles, of tea in England and opium in China, yielded to the English and Indian exchequers a revenue of nine millions sterling.

These simple facts proclaim the vast importance of obtaining a better knowledge of an empire which contains at least one-third part of the whole human race, and whose inhabitants are more ingenious and industrious than any other Asiatic population.

Asiatic Archipelago.—On the subject of the great Asiatic Archipelago, three papers have been read before the Society, to which I shall presently particularly advert. It is just three centuries and a half since this large portion of the globe was first made known to the civilised world, and the larger portion of it is still to be discovered as a field for future exploration. A few words, derived from my friend Mr. J. Crawfurd, will convey a notion of the geographical importance of this field of discovery. The high-road of nations to the empire of China, the Hindu-Chinese countries and Japan, lies inevitably through this Archipelago. It contains four of the largest islands in the world, Borneo, Sumatra, New Guinea, and Luçon, with an united

area of 630,000 miles, or six times the extent of the British Islands. The longest volcanic band in the world runs through the whole Archipelago, to the length of at least 3000 miles. This band (containing no fewer than 45 active volcanic mountains, the lowest of which is higher than Vesuvius, while the highest exceeds Etna), is a distinct region from the non-volcanic portion, and is, by its fertility, distinguished from the crystalline and sedimentary portion.

This non-volcanic portion of the Archipelago, by far the larger, has, however, its peculiar advantages; for while the useful metals are wanting in the volcanic region, they abound in the other. This non-volcanic region contains the richest and the most extensive tin field in the world; for that ore is found, at intervals, over seventeen degrees of latitude; and while its produce is as yet confined to the washing of the alluvium containing the ores, the yield of metal is already double that of Cornwall. Iron ores of excellent quality are found in Borneo, which island also contains mines of gold, which were considered comparatively rich until the discovery of those of California and Australia. Borneo further contains the richest mines of antimony at present known to us, and although discovered only thirty years ago, they now furnish the main supply of Europe. The same island furnishes coal, a mineral far more important (if it be the old coal?) than any of the above, which is at present worked by English companies.*

The vegetable products of the Archipelago immediately useful to man are probably more various than those of any other quarter of the globe. It produces the larger portion of the spiceries consumed by mankind, and its volcanic region is eminently adapted to the culture of corn and pulses, of the sugar-cane and coffee. The present yearly produce of the last article, although an exotic, is estimated not to fall short of 25,000 tons.

In the department of zoology, I will only refer to its principal member, man. The inhabitants are of two distinct races, the Negro and the Malay, and each of these is divided into many sub-varieties, speaking as many different languages as the people occupying an equal extent of America. A curious and important fact, connected with the distribution of man over the Archipelago, is especially deserving of notice. By far the most numerous, and also the most civilised portion of the inhabitants, is found in the volcanic and smaller region. The entire number of the inhabitants has been computed

* On the S. side, coal is also worked by the Dutch.

at twenty millions, of whom no fewer than seventeen are in the volcanic region. Java alone, abounding in volcanic rocks, contains ten millions, or one half the population of the entire Archipelago. The two little volcanic islands of Bali and Lomboc, of which the united area is but 3,300 square miles, have a computed population of 1,250,000, which is probably equal to that of non-volcanic Borneo, of eighty times their extent!

On the subject of the vast country which has thus been sketched, three papers have, as already stated, been read before the Society. The first of these, in importance, is that of Mr. A. R. Wallace, on the Arru, or Aroe Islands. This singular group lies towards the eastern extremity of the Malayan portion of the Archipelago, and is but 200 miles from the south-western coast of the great island of New Guinea, a comparatively shallow channel lying between. They are low islands, for the most part covered with forest, the larger being seven in number, and divided from each other by such narrow channels, that, but for the saltness of the water, the voyager might fancy himself in an ordinary navigable river.

The inhabitants are a quasi-negro people, but now considerably intermixed with Malays, Javanese, and natives of Celebes; some converted to the Christian, some to the Mahomedan religion, but some also continuing heathens. Of all the Oriental Negroes they are the most docile and industrious; being made so by their trading intercourse with strangers. Their sterile land will yield no human food except maize and yams, and they receive their rice from the more western islands of the Archipelago. An extensive bank, on the eastern side of the group, is productive in the mother-of-pearl oyster, in an inferior kind of pearl oyster, in the tripang, or holothurion, and in the shell tortoise; and the fishing of these is the chief employment of the natives. The Aroes are an emporium to which the western traders resort for the commodities now enumerated; while the islands themselves yield most of the birds of paradise, and the various parrots which, under the Malayan names, somewhat corrupted, of Lories and Cockatoos, are esteemed by distant nations.

The similarity or identity of the plants and animals of the Aroe group, man included, with the comparative narrowness and shallowness of the sea between them and New Guinea, has induced Mr. Wallace to come to the conclusion, that these smaller islands once formed part of the continental island. This is a matter which this enterprising traveller and accomplished naturalist will be better able to reason upon when he visits New Guinea, as he proposes.

Meanwhile, I would bring to your recollection that there has been read before us, by our Associate, Mr. John Yeats, an able paper on New Guinea, being a translation from the Dutch of Dr. Müller. That scientific traveller proceeded, in the quality of naturalist, with a Dutch expedition in the year 1835, and his account of the part of the great island which he saw is by far the best which has ever been given to the public.

The third paper is that of Lieutenant de Crespigny, R.N., who proceeded to Borneo, recommended to our distinguished Medallist Sir James Brooke by our late President, Admiral Beechey. Lieutenant de Crespigny gives, in a letter to our Secretary, an intelligent account of a river and country at the extreme northern end of Borneo, probably never seen, and certainly never before described, by an European.

Australia.—We cannot often expect to grasp so much fresh geographical knowledge respecting this vast country of British occupation as was laid before us last year by Gregory and his associates. Still, in respect to that portion of Northern or Tropical Australia in which that expedition first disembarked, and was for some time encamped, many interesting and new details have been produced by Mr. Wilson, the geologist, who has recently returned to England. Having had charge of the camp whilst Mr. Gregory made his first movement southward and ascertained the existence of a saline interior desert, this gentleman lost no opportunity of surveying accurately certain tracts around him, by scanning the nature of the rocks, the botanical products of the soil, and also by observing the natives and lower animals which inhabit the region watered by the Victoria and its affluents. His companion Dr. Ferdinand Mueller, the botanist of the expedition, who was also stationed in the camp of which Mr. Wilson had the charge, thus writes to me from Melbourne respecting him: "I feel it my duty to bear testimony that his exertions in the general duties of the expedition, whilst commanding at the main camp, were praiseworthy in the highest degree." *

After laying down the topography on maps, accompanied by pencil sketches, which give us a fair conception of the horizontal ridges of sandstone and trap rock with occasional limestone, the author estimates that there are tracts of not less than five millions of acres in extent, which, being covered by the richest grasses and

* I may also record the testimony of Mr. Humpherey, a volunteer attached to the expedition, in favour of Mr. Wilson.

well watered, are specially fitted for pasture, and therefore suitable for the permanent settlement of a civilized community. He also points out that no other part of Australia possesses so many navigable rivers as the northern seabord, the Victoria having been ascended by the schooner *Tom Tough* to 100 miles above its mouth. Though necessarily hot, the climate is by no means injurious to European life, as proved by the fact that, although living there for nine months, the party did not lose a man, and scarcely any sickness prevailed. The thermometric tables kept from November to July indicate a range from 47° as a minimum to 106° as a maximum, with 84 days of rain. The grasses are described as so luxuriant as to grow from 6 to 10 or 12 feet in height; large timber is scarce, though smaller and other trees bearing fruit are not rare. Rice was found indigenous in one spot by Dr. Mueller, and in another by Mr. Wilson, who ascertained that it was eaten by the natives. Fish are plentiful, but kangaroos are scarce. Not now adverting further to the descriptions of various other animals, including the curious walking fish, and noting that the dingo or native dog is larger than in other parts of Australia, I revert with satisfaction to the ascertained healthiness of the country as well as to the fruitfulness of the soil to support the suggestion which I made many years ago, and again brought to your notice at the last Anniversary—that, whether by the establishment of a penal settlement or a free colony, North Australia ought unquestionably to be occupied without further delay.

On my own part I adhere to the opinion that, craving as we do any site to which we may transport felons (why not rebellious Sepoys?), there is no region on the globe which combines more advantages, with the gain of a high political object, than the north coast of Australia with its bays and streams. The convicts who might be first planted there, as I have previously shown, will be so completely cut off from all other parts of the seabord of Australia which are occupied or can be occupied for a long time to come, as to prevent the escape of criminals. Now, as few persons will deny that it is of great importance that our maritime power in the Indian Archipelago should be sustained by having a port on the coast of North Australia as a refuge for our ships, and as a "point d'appui" for naval operations in case of war, so I trust that after colonizing the other sides of this continent, England will no longer abstain from unfurling her flag on its northern shores, whether by forced or free labour.

The reader who is interested in tracing the progress of discovery

in Australia will find a clear and well condensed historical review * of the same by Dr. Ferdinand Mueller, to whom I have already alluded, and to whose valuable labours due reference was made at our last Anniversary. Excluding from this summary all that relates to maritime survey, the author enumerates the explorers of the interior in the last 40 years, and indicates the amount of discovery made successively by Evans, Oxley, Allan Cunningham, Hume and Hovell, Sturt, Mitchell, Henty, Grey and Lushington, Strzelecki, Clark, Wickham and Stokes, Eyre, Leichhardt, and Kennedy. Dr. Mueller renders his article doubly valuable by giving in Mr. Gregory's own words a description of the physical geography of Western Australia, in which country that geographer was so long a resident. He further sketches with the pen of one well acquainted with the country the outline of his late journey from Tropical or Northern Australia, and brings together the various notices of recent journeys in South Australia, by Hack, Babbage, and certain settlers, and concludes that any rivers which would afford the means of penetrating far inland can nowhere be expected to exist (setting aside the mighty Murray and its tributaries), unless they be found between the FitzRoy River of North-West Australia and Shark Bay, a region where we have no settlement, and the coast of which has not yet been surveyed.

Colonel Gawler has also printed a little summary of geographical discoveries during 1857, to the west and north of Eyria in South Australia, to strengthen what he considers to be the evidence that the "country to the west of Lake Torrens is the true and practicable line of communication for rail and common road and electric telegraph between the south-eastern provinces of Australia, the great interior, Stokes's Victoria river, and the north-western coast in general." However incredulous I still am, as to the discovery of any considerable extent of really valuable country in the region to the north of Lake Torrens, or in finding habitable and rich oases in the great central portion of the continent, towards which the country seems to lower and become saline, and notwithstanding that I think Colonel Gawler's views too sanguine, it would ill become the President of this Society to damp the ardour of those researches by which alone the question can be permanently settled.

Mr. Hack has already laid open a band of country fitted for pasture, and furnished with supplies of water, which lies between the great saline tract of the seabord explored by Eyre, and the

* Read before the *Institute* of Melbourne, 25th Nov., 1857.

equally saline region on the north as made known to us by Sturt. Now, although this belt may possibly serve as a line of traffic between South and West Australia, it yet remains to be proved if, by surmounting the natural obstacles and want of water on the north, experienced by Sturt, it be practicable to reach beyond the saline desert in that direction, or find in the centre of Australia, any oases of good land supplied with natural springs. Mr. Herschel Babbage, who had distinguished himself by a former survey in South Australia, is now determining the question. This gentleman has recently explained to the Philosophical Society of Adelaide the detailed manner in which he hoped to carry out his survey; and I am happy to say that his project is devised with the mathematical precision and accuracy of delineation, whether as regards the instruments he was to use, or the methods by which he hoped to overcome the obstacles opposed to him, which are well worthy of the son of our eminent mechanical philosopher.

When we reflect upon the arduous task to be accomplished, and the incessant labour of extracting fresh water from salt throughout so vast a breadth of saline country as the party must traverse to reach any portion of the expected land of promise, we cannot too much admire the devotion and skilful appliances with which such difficulties are to be overcome. A cheering vista has indeed been suggested in the reports that cattle have migrated from the north, where they must have pastured: but whether this should prove to be well founded or not, whether the colonists may be gratified by the discovery of a rich interior, which we must all heartily wish for, or depressed by ascertaining the positive continuation of a saline desert northwards, geographical science must gain curious additions by this arduous enterprise.

Gold produce of Victoria.—As fourteen years have elapsed since I first addressed you on the rocks of Australia, which were destined to prove auriferous, and as I have in subsequent years, including our last Anniversary, adverted to the produce of gold, it may be expected that I should say a few more words on the subject, particularly in relation to the highly productive colony of Victoria. Mr. Selwyn, a distinguished élève of the Geological Survey of Britain, and Professor M'Coy, the well-known palæontologist, have now completely set the geological features of the case at rest, and have demonstrated that the principal auriferous quartz veins (or those from which all the productive gold shingle or gravel has been derived) occur in slaty rocks of Lower Silurian age, as proved by

their imbedded organic remains. These veinstones (the reefs of the miner), which are rarely more than a foot or two in width, have here and there yielded a good deal of gold near the surface, and hence numerous shafts have been imprudently sunk deep into them. Many of the operators have already found to their cost that these sinkings are profitless, either by the diminution of the ore or by the expense and difficulty of extracting it. In truth, the result, as far as the present trials go, seems to justify my former inferences as based upon the experience gained in other gold bearing countries. The report of the mining companies of Victoria is to the effect that already ten of the shafts which had been sunk into the solid rock had been abandoned, and that enough had been already done to vindicate the old scientific inference, that in a general sense (though there are exceptional cases) deep mining for gold in quartz rock is profitless.

Very different, however, is the produce derivable from the auriferous débris. For, although many of the old diggings have, as I anticipated, also been exhausted, or the materials which filled the natural troughs and depressions worked out, Mr. Selwyn points to considerable tracts of country over which such auriferous débris will yet be found to extend, whilst he regrets that he is unable to define the probable range and limits of such detritus from the want of any accurate geographical maps. In reference to all the yet unexplored tracts through which it is believed the gold detritus may extend, the geological surveyor naturally calls for the same sort of detailed map as that which represents the gold bearing region near Mount Alexander as trigonometrically surveyed by Mr. W. S. Urquhart, and brought out by Mr. Arrowsmith on the scale of 3 inches to 2 miles.

Referring you to what I said last year respecting the time which may possibly elapse before all the gold shall cease to be profitably extracted from the rich heaps which are more bountifully spread out in Victoria Land than in any known part of the world, I repeat my conviction that, whether in a quarter of a century or more, the period will soon be roughly and approximately estimated (*i.e.* so soon as the geologist is furnished with good maps) when the exhaustion of the *great* produce of Victoria shall take place. Whether the existing causes of the decline in produce, including a deficiency of water for the works, be or be not of a temporary nature, it is a matter of fact that the amount of the past year has been below the average of the preceding years.

AFRICA.

Livingstone, or Zambesi Expedition.—As few events have reflected greater credit on the British nation than their warm and affectionate reception of the good and noble minded Livingstone when he emerged after so many struggles from the heart of Southern Africa, so it is most gratifying to every friend and admirer of that excellent man to know that the produce of his pen as a record of those travels has had so great a sale as to ensure a competency for his wife and children. The 30,000 or 40,000 copies of his remarkable volume, which the public eagerly bought, constitute the real monument which the author has raised for himself!

When I lately presided at the great festival held to wish him and his associates God speed, and dilated upon their prospect of success, I endeavoured at the same time to moderate the over sanguine expectations of the mercantile portion of the public in reference to the trade which might speedily be opened out with these regions.*

It is also well to bear in mind that there are difficulties to be surmounted even in the ascent of the Zambesi, of which persons unacquainted with the oscillatory nature of African rivers must be informed. Thus, Mr. M'Queen, our sagacious critic on all South African subjects, writes to me, that when the celebrated Portuguese traveller Lacerda † ascended the Zambesi in 1798, and when it was in full flood, he found that for spaces of 9 or 10 miles the stream had a depth of 3 feet 4 inches only; the current being so rapid that he was obliged to unload his small boats and transport his baggage by land. We must, therefore, be prepared to hear of similar obstacles to navigation in Livingstone's case; but let us hope that they are now in the very act of being overcome by the forethought and enterprise of a leader in whom we have every confidence, supported as he is by a naval officer, Commander Bedingfeld, of great experience in the navigation of African rivers, and heartily sustained by associates, each of whom is thoroughly adapted to effect the special object of his mission,‡ whilst all of them are sincerely attached to their undaunted and sagacious chief.

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* *See* Proceedings, vol. ii., p. 116.

† Lacerda's Journals of the Expedition to Cazembe were published at Lisbon in the 'Annaes Maritimos' for 1844, and are in our Library.

‡ The other officers in addition to Commander Bedingfeld are Mr. C. Livingstone, secretary and superintendent; Dr. J. Kirk, surgeon and naturalist; Mr. R. Thornton, mining geologist; and Mr. T. Baines, artist and storekeeper.

Niger Expedition.—In reference to the Niger, or Quorra, I have been further reminded by Mr. M'Queen that both Clapperton and Lander have left behind records that the river for some distance both below and above Boussa, if not unnavigable, owing to rocks and rapids, is probably useless as a highway for any trading purpose. In the days, however, of those explorers, steam had not been applied in the ascent of African rivers; and although too great a confidence in that power may have led to the dilemma by which the *Day Spring* was wrecked, we have the satisfaction of knowing that, although the party lost their papers and collections, and saved barely provisions and articles of barter enough to support themselves, and possibly to effect the main object of the expedition, still it was supposed that the persevering and able commander, Dr. Baikie, might succeed in establishing an intercourse with the Sultan of Sokato. At the same time the arrival of another steamer, the *Sunbeam*, which has been so speedily equipped by Mr. Macgregor Laird, will soon restore the confidence in our resources with which it is sought to impress the native chiefs.

We must, however, bear in mind that attempts to navigate unsurveyed tropical (African) rivers must be attended with danger, owing to the great oscillations in their depths between the periods of high flood and those of the dry season.

In thus briefly alluding to the Niger Expedition, of which I still hope to announce good results at our next Anniversary, it is gratifying to know that one favourable circumstance has already arisen out of their effort, in the establishment, by our Associate, Mr. May, of a direct and undisturbed line of transit between Boussa and our great establishment of Lagos, on the coast, which promises to be of high importance in securing our intercourse with Central Africa.

Congo, &c.—The Congo was ascended in the beginning of last year by Commanders Hunt and Moresby, R.N., who, after great exertion in tracking their boats against the powerful current, were finally brought to a standstill by what they consider to have been the cataracts of Yallila, four days above Embona.

The river was broad and uninteresting for the first 70 miles, as far as Embona; but immediately beyond that place the nature of the country it flowed through underwent a complete change, and high hills, diversified scenery, and luxuriant vegetation began to appear. The current increased in rapidity, until at the farthest point reached by the party the Congo poured its whole stream between two promontories only 250 yards apart, roaring and rushing with fearful

violence, and forming immense breakers and dangerous whirlpools, such as no vessel could possibly live through. Commander Moresby considers that a steamer of light draught would have no difficulty in ascending up to this point, which must, I suggest, prove to be of high interest to the geological explorer, who will probably meet near the cataracts of Yallila with the same hard and crystalline axis of the country as occurs in a more northern parallel at Boussa, on the Niger or Quorra.

A short journey has been made by Dr. Bastian in the province of Congo, preparatory, it is believed, to a future and a more extended exploration. Many valuable facts relating to the tribes of the interior are said to have been collected by him.

On consulting with our African Medallist and one of our Hon. Secretaries, Mr. Francis Galton, I find his opinion to be that there is no direction in which an explorer could travel by which he might add more to our knowledge of Africa than by starting from one of the seabord towns of its south-west coast, such as Loando, and journeying thence in a north-easterly direction as far as circumstances would permit, and as near as possible to the eastern countries now being explored by Captain Burton. Every step in such an expedition would, I admit, be a distinct gain, and serve in a remarkable manner to lay bare the vast remaining tracts of the terra incognita of Africa.

Central Africa.—The preceding observations, and those which I offered to you at the last Anniversary in reference to the great difficulties which Dr. Barth had surmounted, naturally lead me to speak of the two concluding volumes of the work of this great African traveller, which are just issuing to the public. These volumes narrate his proceedings subsequent to the death of Dr. Overweg, on the borders of Lake Chad, and include the most interesting part of his entire journey and his sojourn at Timbuctu. In addition to his 'Travels,' Dr. Barth has delivered lectures before the British Association (at Dublin) on the Hydrography of the Niger, before the Asiatic Society on the Ethnology of the Berber (Tuarick) race, and at the last meeting of this Society he gave us an epitome of the physical and social geography of Northern Africa, in the construction of which he made ample use of the labours of African geographers, in a sound knowledge of whose works there are few who rival him.

It will be obvious, from the nature of Dr. Barth's investigations, that it is perfectly impossible for me to condense his results into a

few paragraphs. The main physical features of the land he travelled in, and the principal geographical discoveries of himself and his coadjutors, are already known to us, and are incorporated into the popular geography of the day; as, for example, the desert plateaux with their Alpine oases, the upper course of the Chadda-Benue, and the vast lagoons and floods of these central equatorial regions. For the rest, we are furnished with such a multiplicity of independent details, that broad, general views, calculated to convey a correct, though cursory knowledge of his labours in Northern Africa, can with difficulty be embraced on this occasion. He deals with ten or twelve distinct races, each unlike the rest in features, customs, and languages. We have to consider them as distributed into about as many nations, but in such a manner that the boundaries of their territories by no means coincide with the boundaries of the races; and, in addition to this entanglement, we find large settlements or colonies of Fellatahs and of Tuaricks dispersed about the country, bearing relations of a most diverse and anomalous character, both to the government of the land they inhabit, and to that whence they migrated.

The physical features of North Africa are equally various: a fertile band lies adjacent to the Mediterranean; then comes a desert, studded with oases; and, lastly, by a more or less gradual transition southwards, the scene is utterly changed, and an excessive drought and barrenness give place to the very opposite extreme of humidity and equatorial vegetation. Where, then, the kingdoms do not correspond with the races, and neither of them with the physical features of the soil; where the state of society is in a constant flux of warfare and change, leaving few records of its transitions (and those of the most meagre description, dating back some to the times of the Roman empire, and others to the 10th, 12th, and 14th centuries), it is easy to conceive that a geographer like Barth, whose line of inquiry is eminently historical and social, and who is remarkable for the patient accumulative industry of his countrymen the Germans, should have gathered a mass of matter which his voluminous publications appear insufficient to exhaust, and to which it is totally beyond my power to do justice in this Address. I am, however, convinced that there is no method of epitomising his labours so convenient as that of displaying them upon large maps, variously shaded and tinted, to show the races, nations, population, physical features of the country, and so forth; such as those that were submitted by him at our last evening meeting. Those maps

and his accompanying memoir will, I trust, be hereafter published in the Society's 'Journal,' and it must be to them, rather than to any description of my own, even when aided as I have been by the study of Mr. Galton, that I beg to refer all those readers who desire to learn the nature and the extent of our gains in African geography due to the indefatigable industry of our medallist, Dr. Barth.

Cape of Good Hope.—A careful survey of the lower course of the Orange River has been made by our Associate, Mr. Moffat, the son of the well-known missionary, and the brother-in-law of Dr. Livingstone, under circumstances of difficulty, owing to the exceedingly desolate nature of the country through which that river runs. His paper is of interest, not only as an accession to the descriptive geography of an almost unknown region, or as delineating the northern boundary of our colony, but also as throwing light on the general physical geography and geology of that part of Southern Africa.

Ovampo.—The country of the Ovampo, first reached by Messrs. Galton and Andersson, has again been visited by a party whose expedition ended disastrously. Two of the missionaries of Damara Land, accompanied by Mr. Green and a party of 30 Damaras, had hoped to cross Ovampo Land and to reach the river Cunene. The king of the Ovampo offered them hospitality, but on their arrival, for some unexplained cause, he peremptorily refused them passage, and when they had made ready to return, the population rose en masse, attacked them, and killed one of their attendants. After half a day's defence, in which many of the Ovampo were killed, the party had the good fortune to escape unharmed into the wilderness, and after three days and two nights of forced marches reached a watering-place, and thence made their way back to Damara Land. The route of the travellers was parallel to that of Mr. Galton, and many geographical features were discovered, including a small lake, but the detailed account of their observations has not yet reached us.

Mr. Andersson, the Swedish explorer, to whom we gave one of our honours in 1854, has announced his intention of himself travelling to the Cunene River, and he probably started on his expedition from Walfisch Bay in the beginning of this year. Although he describes himself as very inadequately equipped, we must hope that his long familiarity with South African travel will compensate for other deficiencies.

Senegambia.—The districts adjoining the Senegal are becoming far better known to Europe than they have been hitherto. The French at St. Louis, dissatisfied with their position of dependence upon the

capricious good will of the native chiefs, have made vigorous efforts to secure to themselves an open navigation of the river, respect to their flag, and cession of land for settlements along its course. Much information has been gained in consequence of their exertions; and interesting communications upon Senegambia appear frequently in the 'Revue Coloniale,' a monthly periodical, to which I would direct the attention of those who follow with interest the progress of civilisation in Western Africa, or who may desire to inform themselves upon French colonial interests in general.

Mozambique.—In turning to the east coast of Africa, let me say that Mr. M'Leod, our newly-appointed consul at the Portuguese settlement of Mozambique, is proving himself to be of great service both to his country and to the cause of science. In a letter, dated December 14th, he informs me that he had called the attention of our Government to the great advantages of establishing a steam-postal communication between Aden and the Cape of Good Hope, showing how much time would be saved thereby in comparison with the present line. This subject would have been brought under your consideration, had I not reason to believe that the expenses already incurred in establishing and maintaining the present line of communication are considered too great, on the part of the Treasury, to permit a new large outlay.

Again, in the suppression of illicit measures for carrying on the slave trade, under the name of *Free* Emigration, but which is frequently a mere guise for a real trade in slaves, Mr. Lyons M'Leod, who is exerting himself with energy, gives great praise to the present Portuguese Governor-General of Mozambique, who, despite one-sided judges and the old habits of the colonists, is determined to carry out the sentiments conveyed to the British public, at the Farewell Dinner to Livingstone, by Count Lavradio, the enlightened representative of the King of Portugal, in relation to the extinction of that detestable traffic.

Mr. M'Leod has also communicated to me a rough Portuguese chart, or rather two plans, of the river Zambesi, which, if it had arrived somewhat sooner, might have been really serviceable to Livingstone and his associates. Major Sicard, the Governor of Tete, had promised Mr. M'Leod further information respecting the Zambesi, and also plans of that part of the country where the coal-mines are situated, with a description of the launches now used in conveying the mineral to Tete, the mode of obtaining it, &c. From the same source, our active Consul was also gathering information con-

cerning the medicinal plants of the banks of the Zambesi. He has further written to the Chamber of Commerce of Manchester, informing them that the cotton shrub grows close to his house on the mainland, opposite Mozambique, and that he has already stimulated some of the influential residents to clear a considerable space of ground for its cultivation. As the climate and soil are peculiarly favourable to the culture of the cotton plant, he requests that seeds of the three well-known varieties should be sent to him, in which case he proposes to send the "Nankin" and "Green seed" varieties up the Zambesi, and far into the interior, and to reserve the "sea-island cotton" for culture on the coast; the sandy soil being better adapted for this variety, the growth of which would be favoured by the saline breezes of Mozambique.

In pursuing researches like these, and in thus preparing the way for the great improvement of South-Eastern Africa, which the mission of Livingstone is to carry further out, it is refreshing to find our Consul so zealously and cordially aided by the Governor-General of Mozambique, not only in all objects tending to the suppression of the slave-trade, the improvement of commerce, and the increase of material prosperity, but also in many scientific researches. Among these may be numbered a series of observations on the currents of the Mozambique Channel, for the determination of which the Consul has prepared a thousand copies of a printed circular, with explanations in four languages, which he delivers to captains of vessels sailing to the Mauritius, Port Natal, the Cape, Zanzibar, Johanna, and Bombay, whilst the Port Captain furnishes him with extracts of the logs of the vessels arriving—so collecting materials for wind and current charts, on the plan of Lieut. Maury. When I add that Mr. Lyons M'Leod is keeping a meteorological register on the mainland, whilst the Governor-General keeps one on the island of Mozambique, and that he has steadily made magnetic observations, you will all agree with me that our Associate is a person well qualified, by his energy and capacity, to extend the benefits of commerce, science, and civilisation on the East Coast of Africa.

I am not indeed without hopes that the range of the usefulness of this active Consul may be extended along the East Coast; and that, seeing the importance of establishing regular communication and intercourse between Natal on the south, and the rich Somauli provinces of the Imaum of Muscat on the north, our merchants may drive an extensive and lucrative trade, a considerable part of which,

let us hope, will be furnished from the Zambesi, and out of territories now about to be explored by Livingstone and his comrades.

Expedition from Zanzibar and Mombas into Eastern Africa.—Captain Burton and his colleague, Captain Speke, have now fairly set to work upon their great expedition into Eastern Africa. When they first arrived at Zanzibar many circumstances concurred to recommend a preparatory trip, and the party travelled from Mombas as far as Fuga, following the course of the Pangány river. The setting in of the rains made further progress impossible, and no new information was acquired by Captain Burton upon the white-capped mountains of Kilimandjáro and Kenia. Having partly recovered from the severe acclimatising fever (which no traveller from the Zanzibar coast can avoid, and which had totally prostrated the members of the expedition), the rains having subsided, and porters, asses, guides, with an escort having been procured, Captain Burton sailed with his numerous party from Zanzibar to Baga Moyo, and at once started for the interior. Two communications have reached us relating his further progress; the last of them was dated Sept. 6th, S. lat. 6° 40′, and E. long. 35° 40′, or at a distance of about 200 geographical miles from the sea coast in a direct line. These communications consist chiefly of route maps by Captain Speke, on a large scale, together with numerous observations for latitude and elevation.

On leaving Baga Moyo the party proceeded up the Pangány river to a distance of 120 geographical miles from the sea-coast, passing over an extremely luxuriant country, very level, and abundantly cultivated, but apparently, like other great alluvial or delta accumulations on the immediate sea-bord of Africa, pestilential to European constitutions. At about E. long. 36° 50′ a hilly district was reached, which proved to be the face of a vast elevated tract, gradually sloping upwards towards the interior. At the point whence we last heard from Captain Burton the land had attained an altitude exceeding 2000 feet, and a still more elevated country was before him.

It will be of extreme interest when Captain Burton's report of the geology of the country shall reach us; for even the facts stated seem to bear out the opinion I advanced from this chair at the Anniversary Meeting of 1852, and which the subsequent discoveries of Livingstone corroborated in a satisfactory manner, namely, that South Africa certainly, and the whole of the continent

probably, is a vast trough or basin, encircled on all sides by higher ridges.* It will be recollected how I then showed, that these ridges, wherever we had certain knowledge of them, consisted of primeval or palæozoic rock, for the most part crystalline—that they enclosed fresh-water deposits of younger age, and lacustrine character; and, therefore, that the main physical features of modern Africa, such as I have described them to be, are those which have continued to characterise that continent from the earlier geological epochs down to the present day.

My hearers will also recollect that, justified by the discoveries of Livingstone, I took occasion, at our last Anniversary, to throw great doubts on the existence of snow-capped mountains in these equatorial latitudes. As far as they have gone, the observations of Burton's party throw no new light on that hypothesis; and it still remains to be determined whether or no the Nile, like the Zambesi, Congo, and Niger, has its chief sources in the great watery interior plateau. (*See* Ann. Address, 1857, p. clxx.)†

* *See* also Dr. Livingstone's Cambridge Lectures, with a Prefatory Letter by Professor Sedgwick. Edited by the Rev. Wm. Monk, &c.; with map by Arrowsmith, granted especially by the President and Council of the Royal Geographical Society.

† Whilst these pages are passing through the press, accounts have been received informing us that Captains Burton and Speke had penetrated westwards to near 500 miles from the coast, according to their dead reckoning. They had passed from the Ugogo country, through the Mkali Mgumbu wilderness, had crossed the frontier of the Waniemesi, and they wrote from a place, Unianembe, 70 miles beyond it. The boundaries of the different tribes, and the physical features of the country, so far as our travellers have gone, correspond very closely to the description given of them by the Rev. Mr. Erhardt, who drew his information entirely from native testimony. It will be recollected, that a short account of his memoir, and an accompanying sketch map, were published in the first number of our Proceedings, and, if reference be made to the latter, the point on the line of route whence we have received our latest intelligence will be found to be that which is intersected by the 34th parallel of longitude. Capt. Speke places the real position of the station in question in lat. 5° 2′, and considerably to the westward of that point. The doubts which I ventured to throw out in the Address of last year, respecting the existence of lofty snow-covered African mountains under the Equator whence the Nile flows, and the theoretical view (founded on the observations of Livingstone) which was then propounded, of the origin of great periodical floods by the bursting and overflow of large marshy tracts of Central Africa, might, at first sight, seem to receive some confirmation from the researches and writings of the ancients. My accomplished friend Sir Henry Holland has directed my attention to certain pages of Seneca (Nat. Quæst., lib. vi.), in which that author describes his having conversed with two centurions, who, in the early part of the reign of Nero, had been sent to seek out the sources of the Nile. With the assistance of the King of Ethiopia and other chiefs, they had to so great an extent accomplished their task, that further progress by water was impracticable, for they reached great jungles or marshes (*immensas paludes*) in which the smallest canoe, containing one man only, could paddle. As, however, Seneca speaks also of waters gushing from subterraneous reservoirs as probable sources of the Nile, other geographical friends, who were aware of these writings, do not believe that they are to be viewed as trustworthy accounts of the origin of the great river.

A map of the region to the north of Abyssinia, between 35° 37′ long. E. of Paris, and 15° 17′ N. lat., drawn upon the ground in 1857 by Mr. Werner Münzinger, has been published at Winterthur in Switzerland. Besides the small German work of Heuglin, to which allusion was made p. 284, when the merits of the old descriptions of Bruce were brought

PHYSICAL GEOGRAPHY.

Changes of the Surface of the Globe.—Having gone through a variety of details respecting the progress of our science in the four quarters of the globe, I may now draw towards the end of this Address by a few notes on the general and important subject of *Physical Geography*.

M. de Francq has recently occupied himself with some laborious researches respecting the laws which may be recognized in the distribution of land and sea, and of surfaces of relative elevation and depression on the general outline of the globe. Assuming the whole mass of the earth to have been primitively in a state of fusion, and an outer crust to have been formed by cooling and consequent solidification, he concludes that when this process had arrived at a certain stage, the *shrinkage* of the interior nucleus from continual loss of heat would be greater than that of the outer crust from the same cause, and that consequently the solid superincumbent crust would partly lose its support beneath, and be left in the position of an arch or dome too weak to support itself. The result, it is supposed, would be that the shell would collapse by its own weight, and that its surface would be elevated into ridges and depressed into furrows in various directions, producing the inequalities which we now witness. In this idea there is nothing new; but M. de Francq has another assumed principle which forms the base of his very laborious researches. He assumes *that the effect of this partial crushing of the earth's solid crust will manifest itself equally along every great circle of the globe*—a result which he pointed out to myself on a small hollow globe of thin flexible substance when affected by the tightening of strings which draw it into depressions which are accompanied by parallel depressions. It might perhaps be supposed that this effect on any proposed great arc would be

brought out, the literature of researches in Abyssinia has received in the past year a copious and instructive addition by the publication at Rome, through the Propaganda Congregation, of the work entitled 'Viaggio e Missione Cattolica fra i Mensa, i Bogos e gli Habab,' by the missionary Giuseppe Sapeto. First visiting Abyssinia in company with the brothers d'Abbadie in 1838, and quitting it from bad health after a sojourn of five years, Sapeto made his last journey from Massowah in 1851. His personal adventures, which are told with great animation, form a part only of the contents of this well-filled volume, in which the author has amassed much valuable information respecting the physical geography, ancient divisions, and general history of this country, so gifted by nature, and now in so fallen a state, accompanied by striking sketches of its animal and vegetable productions. He has further added annotations from national documents in the Ethiopian language, with translations into Italian. I am indebted to my friend Dean Milman for an acquaintance with this work, which I had not seen when the Address was delivered, and which is well worthy of perusal by geographers and scholars.—*June* 30, 1858.

properly measured by the *vertical* extent of elevation or depression combined with the *horizontal* extent along the great circle. M. de Francq, however, has taken only the linear horizontal extent as the measure in question. It is for the natural philosopher and the geologist, rather than for the geographer, to pronounce on the soundness of the physical views on which these researches are founded; but the facts respecting the distribution of land and sea, of mountains, plains, and rivers, with which these investigations may make us acquainted, as well as the laws according to which they may be grouped and classified, are equally interesting to the geographer, whatever may be the physical principles on which such researches are professedly founded.

It would be impossible for me to enter into any detailed analysis of the examinations which M. de Francq has made of the phenomena along an immense number of great circles. I can offer but the briefest outline of them. In order to render the investigation as impartial as possible, he has fixed upon eight equidistant points on the Equator, beginning with the meridian of Paris. He takes through each of these points 36 great circles equidistant by 5° from each other, thus forming *four* systems (*roses*) of divergent great circles, each system passing through two opposite points of the eight above mentioned. He then examines the horizontal extent, along each great circle, of the lines of elevation (*arcs d'enhaussement*); along the remaining portion of the circle there will generally, of course, be depression. All dry land is considered as belonging to *elevation*, but the whole bed of the ocean is not regarded as belonging to *depression*; for lines along shallow coasts, ranges of islands, &c., which are only slightly and partially immersed beneath the surface of the sea, are also regarded as *lines of elevation*, being supposed in fact to lie above a certain mean surface, to which elevation and depression are referred. Moreover, these great circles frequently pass across regions which are nearly or altogether unknown, in which case he calculates the lengths of the lines of elevation in such regions on the supposition of their being proportional to the lengths of similar lines along the known portion of the great circle, and adopts these calculated lengths as the most probable lengths of the unknown lines in question. Proceeding on these suppositions, he finds (1) that on all those great circles along which the lines of elevation defined by the existence of dry land form together an arc of less than about 100°, there exist submarine lines of elevation, which, together with the terrestrial ones and those which are as-

sumed to exist in the unknown regions traversed by any great circle, make up very nearly the amount just mentioned of 100°; and moreover, that all such great circles are each characterized by very nearly the same number of transverse lines (*alignements terrestres*) which run perpendicularly to the great circle, and are marked by salient points of the earth's surface, or are recognised as lines of volcanic action, or lines along which, at least, earthquakes are not of unfrequent occurrence. M. de Francq also finds (2) that those great circles along which the terrestrial lines of elevation constitute together an arc of more than about 100° are not accompanied by the transverse *alignements terrestres*, but by others which are parallel to their own directions respectively. These appear to be two of the principal generalizations at which M. de Francq has arrived respecting the existing geographical distribution of land and sea; and one of the most interesting deductions from them may, perhaps, be stated to be that which he draws respecting the probable existence of considerable tracts of land in the polar regions. He finds that those great circles of the first class above mentioned which traverse the polar regions are most defective in the extent of their *known* lines of elevation, but the whole arc above mentioned of 100° is made up in such cases by the calculated probable extent of such lines in the *unknown* polar regions. The harmony thus established between the great circles which traverse the polar regions, and those which lie without them, is regarded by M. de Francq as a proof of the truth of the hypothesis that a considerable extent of land exists in the neighbourhood of one or both the poles of our globe.

One of the great objects of my intelligent and indefatigable friend the Baron de Francq in publishing the ingenious memoirs* which he has successively laid before the French Academy of Sciences, the application of his theory to some of the great geological features of the globe, as specially indicated in the last of these communications, cannot now be adequately discussed. The consideration of this vast subject, on which the eminent geologist Elie de Beaumont has written so ingeniously in propounding views which M. de Francq supports, would occupy in fact a large part of a purely geological discourse. The physical data, however, which the author has arranged and discussed with great perspicuity and infinite pains, in-

* De la Formation et de la Répartition des Reliefs Terrestres, Mém. de l'Académie des Sciences, 28 Fév., 24 Mars, 2 Juin, 1856, et 15 Mars, 1858. *See* also Bull. de la Soc. Géol. de France, 2 sér., t. x., 1853.

volve questions of high importance to every one who speculates upon the causes which have operated in producing the chains of mountains, and corresponding depressions of the earth's surface.

Movement of Waves.—An original view of the undulatory movements of the sea and its currents has been published at Rome * by Commander Cialdi, of the Pontifical marine service, author of various other works of merit on analogous subjects.† It is out of my sphere to judge the merits of the work of this ingenious author, who, whilst I write, has visited London, to conduct to the Tiber two small steamboats; but I may briefly say, that after an elaborate detail of facts, drawn from the writings of a multitude of mariners, engineers, geologists, and others, to the number of nearly two hundred, and also citing his own long experience when in the Sardinian navy, he endeavours to counteract by such data the prevalent theory of eminent mathematicians, which does not admit of any real motion of transport in the molecules which constitute a wave, nor the power of waves at great depths. To give my hearers some idea of the main object of a work which has been highly commended by the Accademia dei Nuovi Leicei of Rome, as well as by the Academy of Venice, I here cite the author's own words, as conveying his main views:—

"I am convinced," says Cialdi, "that the real motion of translation (or driving movement) in an undulating mass of water always exists during violent winds and storms, whatever be the depth of the sea; and that it also obtains in moderate weather, but only where the inferior, the lateral, or the frontal development of the wave finds an obstacle, at any distance whatever from the shore. I also maintain that the motion communicates itself to the whole mass that constitutes the wave, when the latter cannot develop itself; and that the intensity of the motion is greatest at the bottom of the sea, and least on the surface, when the depth of water is relatively small, and when the wave is not broken. I further maintain that the effects of this motion are more or less perceptible according to the nature and form of the obstacle, the volume of the undulating mass, and the velocity of its propagation. Moreover, these effects must prove very complicated, and produce all the varied series of powerful phenomena that we observe on abrupt coasts, piers, breakwaters, and shelving shores."

* 'Cenni sul Moto Ondoso del Mare e sulle Correnti di esso, 1856.'

† 'Studi Idrodinamici Nautici e Commerciali, Roma, 1845;' 'Sul Tevere e la Unione dei due Mari, Roma, 1847;' 'Studi sur Porto di Livorno, Firenze, 1853.'

Current Charts.—Mr. A. G. Findlay has constructed an excellent chart of the North Atlantic Ocean, on four sheets, which embodies in a condensed form the results given in the extensive series of charts published by the American Bureau of Hydrography, as well as other authorities. This chart, intended for the use of sailors, will show the connexion between the different branches of the meteorology of the sea, the similarity between the circulation of the air and water over its area, and their effects on the temperature in different seasons. Among the results it appears that the great mass of waters takes about one year to travel from the Bay of Biscay to the Gulf of Mexico, while the more rapid circulation of the smaller volume from the Mexican Gulf, by the Gulf-stream, occupies about eight months in reaching the shores of Europe. These periods, derived from a careful calculation of all attainable observations, accord very closely with that of the drift of bottles, a collection of which, made by Capt. Becher, R.N., shows that the currents are not so rapid as has been usually considered.

The Gulf-stream ceases to be a marked current after passing eastward of the Newfoundland Banks; its warm waters are then drifted to the east and north-east by the prevailing south-west and west winds, by which cause its effects are propagated to Britain and the coast of Norway.

In 1838 Mr. W. C. Redfield propounded the theory, that the Arctic currents, after passing over the Banks of Newfoundland, flowed beneath the Gulf-stream to the southward and south-westward—a theory which has been confirmed by American navigators, who have found that at a depth of 370 fathoms, or bed of the Gulf-stream, in its narrowest and warmest part, the temperature is at zero. This remarkable and exceptional phenomenon does not, however, extend eastward of 46° W. meridian; for Commander Dayman found in that longitude that the water had a temperature of 39°·7,* at a depth of 1000 fathoms, in two instances, showing a remarkable contrast in so small a distance.

The Arctic current had been considered to be lost at Cape Hatteras, in its south-west course; but the cold bands which have been observed by the American surveyors to exist in the Gulf-stream must be derived from this source. There is another curious subject for consideration—the peculiar configuration of the coast of the

* 39·5° is the temperature assumed by Sir Jas. Ross as that at which sea-water has its maximum density.—*Voyage to the South Pole*, ii. 156, 375, 384.

United States between Cape Hatteras and Cape Fear. These, as Mr. Findlay has suggested to me, may be the result of the conflicting hot and cold currents there neutralising each other, and producing those long sand ridges projecting transversely to the direction of the two streams from Cape Hatteras, Cape Fear, and Cape Lookout, which promontories are separated by long sweeps of low diluvial shores. This reasoning is indeed sustained by another fact, evident on a close examination of Maury's thermal charts, viz., that the Arctic current, or other very cold water, flows to the south-east from off these capes to the southward of the Bermuda Isles.

Deep-Sea Soundings—Geological Analogies—Atlantic Telegraph.—At our last Anniversary your attention was riveted to the great project of establishing a communication between Britain and America, and the preparations for carrying out that noble project. Among these I announced that the paddle-wheel steam-frigate the *Cyclops* had preceded the *Agamemnon*, and that steps had been taken by the Admiralty to secure for naturalists all the materials, whether animal or vegetable, which might be brought up from the sea bottom. This object has been efficiently carried out across the North Atlantic, between Valentia in Ireland and the coast of Newfoundland, the methods employed, and the results, having been clearly reported by the commander of the vessel, Lieut. Dayman. The apparatus employed was a modification of that invented by Mr. Brooke, of the United States Navy, and the results have unquestionably given us a much more extended knowledge of the bed of the Atlantic, and of the temperatures and densities of its waters, than were ever before obtained, thanks to the excellent conduct of the officers and men employed.

Referring to the printed Report for many instructive data respecting the meteorology of the ocean, I will now briefly allude to the support which has been given to geological science by the operations of the officers of the *Cyclops*. The submarine section, which is given at the bottom of Plate 1 of the Report, teaches us, as before said, that, in the 15° of W. long., or about 180 miles from the shore of Ireland, the plumb-line suddenly descends from 550 to 1750 fathoms. This wall of 1200 fathoms in height suggests the idea of one of those former movements by which the crust of the earth has been broken through by a long and deep fissure or sudden disruption.

Another feature of great geological interest is, that having once quitted the comparatively shallow water on the coast of Ireland,

all the soundings, twenty-six in number, which were made in crossing the deep ocean, or between the 15° and 45° of W. long., with two exceptions, when stones and shingle were met with, have proved that the bottom, whether at the maximum depth of 2424 fathoms, or of 954 fathoms on nearing the shores of Newfoundland, is composed of a soft mealy substance, to which Captain Dayman gives the name of ooze.

Now it was a point of great interest to the geologist (one in which I took some personal interest before the expedition sailed, by communicating with Captain Washington, the Hydrographer) to collect any organic bodies brought up from these extreme depths. At my request, indeed, Professor Huxley drew up instructions for the proper preservation of any such objects, which were carefully carried out by Commander Dayman and Dr. Gimlett, the medical officer of the expedition. The specimens of ooze, which have been examined by Professor Huxley, of the Government School of Mines, have led him to believe that nine-tenths of this fine muddy deposit consist of the minute animal organisms called Foraminifera, composed of carbonate of lime, and that 85 per cent. of these are referable to the genus Globigerina, in all its various and multiform stages of growth.

Great as is the interest attached to the question, of whence this infinite quantity of these small creatures, mixed with some other Foraminifera, is derived, Professor Huxley does not pretend as yet to be capable of answering it entirely; but, knowing that highly organised animals can live at depths of 300 or 400 fathoms, he is disposed to think that these vastly humbler creatures may have existed at the great depths from whence they are dredged up. Now this ooze, or fine marine mud, not a little resembles our chalk, which also contains the same genus Globigerina; and just as the chalk has similar persistent characters, from the cliffs of Albion to Orenburg in Russia,* so this submarine ooze maintains the same aspect and composition over a nearly equal breadth between Britain and America.

Let us hope that, when our Admiralty again decides upon obtaining a systematic series of deep sea soundings, a professed naturalist will be one of the party, in order that, among many curious problems relating to submarine life, he may determine whether foraminifera can exist at such great profundities, or whether, living

* *See* 'Russia in Europe,' vol. i., p. 272.

at a higher zone, they have on dying simply subsided, to form the chief part of the fine, undisturbed, muddy bottom.

In the mean time the survey of the *Cyclops* has shown, that a perfectly tranquil and secure resting-place is ready for the reception of the greatest length of the cable of the magnetic Atlantic telegraph. May then the accidental misfortune of last summer be avoided, and may the able and vigorous measures of the Company employed in carrying out this grand international work be eventually crowned with all the success they deserve.

Conclusion.—I have now, Gentlemen, to apologize for having detained you so long in my endeavour to lay before you, not merely an analysis of our own labours, but also of those which have been in progress in most parts of the world, together with brief indications of the theoretical as well as practical appliances by which geographical science has been advanced. Let me conclude then with a few words on some of our own immediate operations as sustaining the reputation of the Society, and as influencing public opinion.

The volume of our Journal, the 27th in number, which has recently been issued, has, I trust, been found equal in merit to any one of former years. The mere announcement of some of the names of the contributors and subjects sufficiently testifies that we are well working out our varied objects of research. Thus, whilst the soldier and scholar are gratified with the scrutiny of certain campaigns of the ancient Greeks placed before us by General Jochmus, as derived from a critical examination by him of battle-fields and marches, other comparative geographers may trace with Loftus the course of the Eulæus.

In delineating those parts of Persia with which he has long been familiar, General Monteith has shown us the lines by which bodies of men can advance, and those where great difficulties must be encountered; whilst Rawlinson, comparing ancient with modern geography, has clearly demonstrated the extent to which the delta of the Euphrates has advanced upon the Persian Gulf in the historic period. Again, in the same region Abbott describes the route from Shiraz to Fessa and Darab; and in turning to the hitherto slightly known country of Burma, we have been furnished with a comprehensive, clear sketch of its geographical features by Captain Yule.

From Africa (not to speak of other contributions) we have those original letters of Livingstone which foreshadowed the admirable work which that explorer was destined to produce; whilst from

British America we have put forth Colonel Grant's practical and useful account of the large island of Vancouver, now rising into vast importance through its fine bays and ports, both as a noble station for maritime enterprise in the Pacific, and a future scene of commerce with our newly discovered golden region in the Rocky Mountains.

In short, all our publications, so ably edited by Dr. Norton Shaw, whether they appear in the more matured and staid form of the Journal, illustrated by those excellent maps of Arrowsmith, which give an impress of accuracy to every work of which they form a part, or those popular Proceedings which keep up the "esprit de corps" of our members, and are constant mementos of the animation of our Evening Meetings, have, I am happy to say, given general satisfaction to all readers.

Rejoicing at our last Anniversary at the great rise of this Society in public estimation, it is truly a source of pride and satisfaction to me to see that in the short interval which has elapsed, 166 new members have joined our ranks, and that we now reckon nearly 1100 ordinary associates, or nearly double our numbers in earlier years.

The grant of the use of their apartment for our meetings, by the University of London and the Royal Society, has been of signal advantage; and many of you can testify that the attendances have been so good as almost to crowd that spacious hall.

Let us hope then that this liberal encouragement will be continued; for no one who has participated in our Evening Meetings can doubt that they are productive of enlightening effects upon society in general, by the diffusion of a much greater love of geographical science and foreign travel than was ever before exhibited in this metropolis. I do not hesitate therefore to assert, that the Royal Geographical Society has now taken such firm root in our country, both as regards commercial and public affairs, as to have become part and parcel of the common-weal. Thus, many of Her Majesty's Secretaries of State, whether past or present, belong to us, and afford us the best support by the transmission of documents which we publish at our own expense, and which, though of great importance to geographers as well as to merchants and travellers, would without our aid have remained unknown. Then again, our Map Office and Library in Whitehall Place are the rendezvous for any persons, official or private, who desire to consult the best geographical documents; this great public advantage being gained

simply by the grant of 500*l.* per annum—a sum I venture to say not amounting to a tenth part of what would be incurred, if our highly useful and really national establishment were managed by any Government.

High as we have risen in the last few years, I feel indeed confident from what I see around me, and from a pretty intimate acquaintance with the mainsprings of our prosperity, that our future career may be rendered permanently useful and brilliant, provided only there be a continuance of the same hearty union and good fellowship which now so happily prevail among us. For the part I have borne in this cheering progress, whether in aiding the onward march or in sustaining the dignity of the Royal Geographical Society, I can with gratitude say that my poor efforts have been much overpaid by your kind approbation. Let me then assure you, that as by a sort of friendly fiction, you have evaded the regulations which prescribe that your Presidents should successively retire from office after two years' service, and are pleased to view my first year's labours during the present consulate, as having been given for my lamented predecessor Admiral Beechey, I will try to perform my duties as before, and will not shrink from the endeavour to render my seventh year of probation as effective as any one of my preceding terms of office.

P.S.—An important geographical feature in the outline of the western portion of the Himálaya Mountains has come to my knowledge since this Address was printed. By permission of our Associate and Gold-medallist, Col. Andrew Scott Waugh, Lieut. T. G. Montgomerie has published, in the fourth number for 1857 of the Journal of the Asiatic Society of Bengal, a Memorandum on the Snowy Mountains of the Kashmir series of the Himalayas, in which the Nanga Parbat or Dagarmur, to the north of Kashmir, is estimated at a height of 26,629 feet above the sea.

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1858.

Fourteenth Meeting, Monday, June 14th, 1858.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

ELECTIONS.—*His Excellency Count Platen, Minister of Sweden and Norway; Charles Cavendish Clifford, Esq.*, M.P.; *the Revds. William Atherstone Hales*, M.A., *Samuel William King*, A.M., *and Henry Lewis*, M.A., *and Edward David Ogilvie, T. J. De Bourgho, Pascoe Charles Glyn, William Nicholas Reed, Samuel Leigh Sotheby, and William Reynolds Vines, Esqrs., were elected Fellows.*

EXHIBITIONS.—A Map of the United States and the adjacent countries, from Hudson Bay to the Rio Grande, including the whole of British America lying south of Hudson Bay and Newfoundland, measuring 15 feet 4 inches by 26½ feet, was exhibited by Mr. H. V. Poor, of the United States; and a large painting of the family of the geographer, Gerard Mercator, found in the Earl of Peterborough's house at Southampton, was exhibited by Mr. Evans.

DONATIONS.—Among other numerous donations to the Library and Map-Rooms since the previous meeting were, Record Map of Sebastopol, by Captain F. Brine, R.E., F.R.G.S.; maps of the Canton of Zürich, by Professor Ziegler, F.R.G.S.; Report of the Geological Survey of Canada, with accompanying Atlas, by Sir William Logan, F.R.G.S.; the North-West Passage and the plans of search for Sir John Franklin, by John Brown, F.R.G.S.; the Indus and its Provinces, by W. P. Andrew, F.R.G.S.; Dr. Livingstone's Cambridge Lectures, by the Rev. William Monk, M.A., &c., &c.

ANNOUNCEMENTS.—The PRESIDENT announced that Dr. Baikie of the Niger Expedition had written to say that Lieut. Glover had obtained, during his journey to Busa, an old volume, apparently belonging to Mungo Park.

The Papers read were—

1. *Notes on a Map of the United States and the adjacent Countries.* By HENRY V. POOR, Esq., of New York.

THE best route of commerce across the continent seems to be indicated by the direction in which its great rivers run. The St. Lawrence, running very nearly east, carries a navigable water line into the heart of the continent, a distance of 2500 miles from the Atlantic Ocean. The Upper Missouri, very nearly upon the same parallel with Lake Superior, runs almost due east for 600 or 700 miles, after issuing from the Rocky Mountains. The waters of this river interlock with those of the Columbia, the great river of the Pacific slope of the continent. The directions of these great rivers indicate a deep depression in the continent, extending from ocean to ocean, and a favourable route for a great highway to connect them.

But upon going north, we find a much lower depression than that occupied by the valley of the Missouri River. Lake Winnipeg is only slightly elevated above Lake Superior; the surface of the latter being about 590 feet above the sea, while that of the former is about 850 feet. The rivers that flow into this lake from the south and west have very gentle and uniform currents. The Red River of the North has an inclination of only two or three inches to the mile, and is navigable nearly to its source, by large class steamboats, at all periods of the year when not obstructed by ice. The Saskatchawan, which flows from the west, is one of the great rivers of the continent. Near its entrance into the lake it is for a short distance obstructed by rapids. From the head of these to the Rocky Mountains there is no obstruction to the navigation of the river. The valley through which it runs is depressed from 1000 to 1200 feet lower than that occupied by the Missouri River upon similar meridians. At the mouth of the Yellow Stone River, 102½° west from Greenwich, the surface of the Missouri River is about 2180 feet above the level of the sea. Fort Cumberland, on the Saskatchawan, and very nearly on the same meridian, is only about 900 feet above the sea. Both rivers have, probably, very nearly the same rate of fall. The eastern slope of the Rocky Mountains at the source of the Saskatchawan is, consequently, much more depressed than at the source of the Missouri. This fact would indicate, that after leaving Lake Superior, the best route for a railroad across the continent deflects, northerly, into the basin of Lake Winnipeg and its tributaries, assuming that the mountains can be passed at the head of the Saskatchawan as well as at the head of the Missouri River.

This northern inclination of the route I consider of no solid objection on the score of climate. Only a small amount of snow falls during the winter season—not enough probably to create any inconvenience to the running of railway trains. On going west, the climate becomes much milder. The same law in regard to climate prevails in the western as the eastern hemisphere. It has been well ascertained that the climate of the eastern coast of Asia corresponds almost exactly with that of America, while the climate of the western coast of America is equally mild with that of the western coast of Europe. The isothermal line, after leaving Lake Superior, runs in a north-westerly direction, entirely through the British Possessions, and shows that a large portion of the territory drained into Lake Winnipeg possesses as favourable a climate as some of the best portions of Canada or the United States. In fact the Hudson Bay Company have in possession an area of country equal to six or eight first class American States, admirably adapted to agriculture, with a genial and attractive climate. There is no portion of the United States that will, in a very short time, possess better facilities for commerce. As already stated, the Red River of the north, running into Lake Winnipeg, and interlocking with the head waters of the Mississippi, is navigable nearly to its source, for large class steamboats. To this river a railroad is already in process of construction from St. Paul, an important town at the head of navigation on the Mississippi River. A railroad will, before long, be constructed from the head of Lake Superior to the same point. The distance for which this river is navigable is something over 500 miles. Lake Winnipeg extends in a northerly and southerly direction, nearly, if not quite, 400 miles. Its length is equal to that of Lake Michigan, one of the largest of the great American lakes. With the exception of some rapids near its mouth, the Saskatchawan is navigable to the Rocky Mountains. In a few years more the improvements described will render this territory as accessible to emigrants as any portion of North America. It is therefore of the greatest importance that it should be thrown open to settlement, as an act of humanity to the emigrant, who will soon be unable to procure cheap homes either in the United States or Canada, and as a means of increasing the number of inhabitants in the colonial possessions of Great Britain, and thereby its commerce and trade.

In causing the map (now exhibited) to be drawn, my object was to present at a glance, the geographical and topographical features of the United States, together with its political subdivisions, and its public works. In the topographical features of the United States and Canada there are several great divisions that differ exceedingly

from each other. The western portion of the continent delineated, is occupied by several mountain ranges rising from an immense plateau, extending nearly one third of the way across the continent from east to west. On some parts of this plateau, the width of these mountain ranges is nearly 1000 miles. The great plateau on which they stand begins to rise from the Mississippi and Missouri Rivers. At first the ascent is gradual, but after going west about 500 miles from the valley of the Mississippi River, the rate of ascent of that portion of it drained by the Red Arkansas, Platte, Kanzas, and Niobrahah, increases to about 8 feet to the mile, till an elevation is reached of from 7000 to 8000 feet above the sea. The western slope of this plateau, and of the mountains which crown it, is, on the other hand, very abrupt—the mountains rising in some cases to an altitude of 13,000 feet in a distance of 100 or 150 miles from the Pacific coast. Between the summits of the Rocky Mountains on the eastern slope of the plateau, and the Sierra Nevada lying on the western, is an immense elevated, arid, and desert plain, having an independent system of lakes (salt), and rivers, similar to the systems of the Dead and Caspian Seas.

The easterly slopes of the plateau of the Rocky Mountains partake largely of the character of the plateau itself, being arid and sterile, till the meridian of 99 or 100 west from Greenwich is reached. In the United States, with the exception of the head waters of the Missouri, only a small, if any portion of the territory between the meridians named, and the summits of the Sierra Nevada, can be cultivated without irrigation; a fact which is only imperfectly understood even by the people of the United States. After the Sierra Nevada is crossed, there is a narrow belt of fertile and well watered country occupied by the states of California and Oregon and the territory of Washington.

The next grand division shown on the map is that occupied by the Mississippi River. This presents features entirely dissimilar to the division just described. It is characterised by the uniformity of the surfaces and inclinations of its great plains, their slight elevation above the sea-level, and the fertility of their soil. The surface of the Mississippi River at the mouth of the Ohio, 1200 miles from the Gulf of Mexico, is only 275 feet above the level of the sea. Above the mouth of the Ohio, the rate of fall is more rapid, yet still very uniform. At the mouth of the Minesota River, 2192 miles from the Gulf, the elevation of the Mississippi is only 744 feet above tide. The rate of fall from this point to the sea is about 4 inches to the mile. The Mississippi River, though much inferior to the Missouri in length, and in the area of the

country it drains, occupies a much lower level. The dividing line between the Minesota, a branch of the Mississippi, and the Red River of the north, running into Lake Winnipeg, is less than 1000 feet above the sea. The Missouri River, draining the eastern slopes of the great Rocky Mountain ranges, occupies a much higher plane. At the mouth of the Yellow Stone, about 3260 miles from the sea, its elevation is about 2180 feet. At the foot of the Grand Falls of the Missouri, 3960 miles from the sea, the elevation of the surface of the river is about 2600 feet above tide. The Missouri at its mouth is about 380 feet above tide. The distance from this point to the Grand Falls is about 2570 miles. The river falls, consequently, in this distance about 2220 feet, or at the rate of a little more than 10 inches to the mile. The rate of descent is remarkably uniform; —the lower portion of the river being, probably, the most rapid. Steamboats can run from the Gulf of Mexico to the Grand Falls, a distance of 3960 miles.

It is to the gentle descent of its great rivers, and the ease with which communications can be effected between them, that the United States owe their remarkable facilities for an internal commerce. Lake Superior, the source of the St. Lawrence River, is elevated about 590 feet above the sea. This elevation is distributed over a distance of 2500 miles, the greater portion of the descent being grouped at two points, the falls of Niagara, at the outlet of Lake Erie, and the falls of the St. Lawrence, at the outlet of Lake Ontario. By means of canals this magnificent watercourse is rendered navigable for its entire length. A vessel of large class may now clear from the head of Lake Superior, in the very heart of the continent, for Liverpool or London. A steamer may leave the same point, passing through the Straits of Belle-Isle, the Atlantic Ocean, to the Gulf of Mexico, and up the Mississippi to within *one hundred* miles from the point from which it started, after having made a voyage of nearly 8000 miles. These facilities for commerce give value to the produce and the lands in the interior of the continent, without which they would be valueless. Produce can now be taken from Chicago to New York by water, a distance of 1500 miles, for seven or eight dollars per ton. Owing to the smaller quantity of freight going West, the charge for heavy articles in this direction is only about five dollars per ton. The charges for transportation on the Mississippi River from St. Paul, and from Pittsburgh, at the head of navigation on the Ohio, both more than 2000 miles from the Gulf of Mexico, are at very nearly the same rates.

In speaking of the great interior basin of North America, a portion

of it occupied by the Great Lakes is necessarily embraced. The dividing line between the waters running into the lake, and those running into the Mississippi, is for a long distance imperceptible—the country drained by each presenting similar aspects and structure. The highest point on the line of the Illinois Canal, between Lake Michigan and the Illinois River, a tributary of the Mississippi, is only *eight* feet above the level of the lake: in other words, a cut of ten feet in depth, for not a great distance, would turn a portion of the waters of Lake Michigan into the Mississippi—so nicely poised in the centre of the continent are these great Inland Seas. It seems not unlikely that the ocean once flowed through the valleys of the Mississippi and St. Lawrence, forming an island of that portion of the United States occupied by the Alleghany, and its connecting ranges of mountains.

The third grand division of the continent shown on the map is that drained by the St. Lawrence and its tributaries. Although upon the south shores of Lakes Michigan and Erie there is nothing to mark the dividing line between the great division already described and the one now under discussion, as we go north and east the boundaries between the two become well defined. The summits between Lake Superior and the Mississippi are elevated all the way from 500 to 800 feet above the lake, except in one instance, at the head of the St. Croix River, where there is a break, the lowest point of which is only 366 feet above the lake. On leaving the south shore of Lake Michigan and going east, the surface of the country gradually rises, till it attains, in the State of New York, an elevation of nearly 1700 feet above the sea. This plateau, both in the States of New York and Pennsylvania, falls off abruptly into the basin of Lake Erie, in a distance, in many cases, of six or eight miles. The head waters of the Ohio, the great eastern tributary of the Mississippi, rise within a few miles of this lake. In fact, all the great lakes have only a very limited area of drainage on their southerly shores. It is not till Lake Ontario is reached that the St. Lawrence basin becomes well marked. As the waters of Lake Michigan could, without great expense, be turned into the Gulf of Mexico, so could the waters of Lake Erie be conducted into the harbour of New York. The great plateau of the Alleghanies, a short distance from the outlet of Lake Erie, suddenly falls off into the basin of Lake Ontario. At the dividing line between the waters flowing into this lake and the Hudson River, it is depressed 145 feet *below* the surface of Lake Erie. It is through this great defile or depression in the continent, that the Erie Canal is constructed. The long level on this canal, which corresponds to

the crest of the Great Alleghany range, is 69 miles long. This canal is the eastern outlet for the great interior basin of the country, as is the Mississippi River of the southern. On going still farther northeast, another remarkable depression occurs in the general surface of the country, being that occupied by Lake Champlain. This lake is elevated only 87 feet above the level of the sea. Easterly of this depression, which extends all the way from the St. Lawrence River to the Hudson, the dividing line between the St. Lawrence and the rivers flowing into the Atlantic Ocean is a well defined and comparatively lofty mountain range.

The last grand division shown on the map is the Atlantic slope of the Alleghany mountain ranges. This is comparatively insignificant in extent, though at present the principal seat of the population of the United States, and of its leading commercial and agricultural communities. It extends from the Gulf of St. Lawrence to the Gulf of Mexico, embracing the two lower British North American Provinces. It has an average breadth of about 350 miles. This division is composed of belts of country very dissimilar in their aspects. With the exception of the New England States and the Provinces named, that portion of it lying immediately upon the sea-coast is low and marshy. The width of this belt varies all the way from 10 to 50 miles. This is succeeded by a more elevated, though comparatively depressed and level belt, composed of sandy plains, covered with pine forests. The slopes of the plateau from which rise the Alleghany Mountains are next reached, and with them, the most fertile portions of the Eastern States. The general elevation of this plateau is about 2000 feet above the sea. Upon this, the mountains rise to an elevation, in some cases, of over 6000 feet above the sea. The breadth of the Alleghany range of mountains will average from 200 to 300 miles. For the greater part of their height they are composed of several parallel ranges, having the general direction of the Atlantic coast.

As I did not expect to be called upon to make any remarks, such as I have made have necessarily been somewhat discursive, and totally inadequate to so broad a subject as the topography of the United States. The map now exhibited will supply the want of greater detail on my part. I have only attempted a brief outline. The map is based on the coast survey of the United States, conducted by Professor A. D. Bache, whose eminent scientific attainments, I am happy to know, are properly appreciated by your learned Society. The interior is compiled from the surveys of public lands of the United States, and the surveys of several proposed routes for railways across the continent, and surveys conducted

by the several States. It also shows 26,000 miles of railway in operation in the United States, and nearly 3000 in Canada, and some 8000 or 10,000 more in process of construction, and about 6000 miles of canals.

The PRESIDENT.—I need not say that we are very much obliged to Mr. Poor for his very lucid explanation of this large and valuable map. When he tells the geographers, who have just adjudicated their gold medal of the year to his distinguished countryman, Professor Bache, that this map is founded in great part on the coast survey, we know what value is to be attached to it.

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2. *Notes on Borneo.* By Lieut. C. A. C. DE CRESPIGNY, R.N., F.R.G.S.*

A. *Ascent of the River Limbong.*

Labuan, Sept. 7, 1857.

DEAR DR. SHAW,—I enclose you a map or plan of the Limbong River, for the information of the Royal Geographical Society. May I beg you to send a copy to the Admiralty, as my time runs so short that I shall not be able to make one.

With regard to the Limbong, but little can be said of interest. I ascended it in preference to any other river, because it runs through a less elevated country than the others in the neighbourhood, and therefore its ascent at this time of year would be comparatively more easy, and because the late irruption of Kyans into the country about its upper parts created a desire to inspect the scene of their devastation.

I found the country on either side of this fine stream thinly peopled, and the inhabitants very poor. In the upper villages, among the Bisayans, the people lived, in addition to their rice, upon wild hogs and snails, principally the latter. The Malays near the mouth of the river, and for 50 miles up, cultivate rice and sago, but not much, for fear of becoming rich, when they would fall the prey of one of the numerous Bruni pangerans (feudal chieftains). The formation of the country appears to be sandstone, slate, clay containing iron, blue clay, fine loam, and decayed vegetable matter. I passed two rapids, the lower running over large pebbles of sandstone; the upper, sand and snags. I passed also the ruins of two villages destroyed by the Kyans, who, in number 3000, had taken 100 heads, and two others deserted by the inhabitants, who had moved lower down the river. In front of one of these was a rude wooden statue in honour of taking a Murut chief. I arrived

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* *See* Proceedings, Royal Geographical Society, vol. i. p. 205, &c.—ED.

at Damit, the temporary residence of the Kyans during their descent on this country, and found the remains of 30 large temporary houses, capable of accommodating 2000 persons. I was struck with the fact, that most of the floorings, raised, of course, a few feet from the ground, inclined towards the centre, like our Crimean huts. I was informed by a wandering party of Bisayans, in search of hogs, that there was another encampment a short distance higher, and that I was within 30 miles of the place where the Kyans haul their river-boats overland from the river Barram into the Limbong. My provisions, however, ran short, and not a plateful of rice or a single fowl could be purchased from the poor victims. It had been my intention to proceed slowly down the stream and to make little excursions on either side at interesting points, but under these circumstances I was obliged to descend as rapidly as possible. I would, if I thought the Society would be interested, write a much more detailed account of my trip. I am about to sail in my prahu for Malúdu Bay, to pass the rainy season. In January, or soon after, I shall ascend the Barram.

Believe me very faithfully yours,

C. A. C. DE CRESPIGNY.

B. *Visit to Malúdu Bay.*

Labuan, Nov. 22, 1857.

SIR,—ACCORDING to previous determination, I sailed from Labuan in my prahu on Sunday the 13th of September, and, notwithstanding the very heavy weather, arrived off the mouth of the River Bongan, which flows into Malúdu Bay, on the evening of the 21st, without having experienced any damage beyond the loss of my boat and one anchor. I must confess that I was not a little anxious as to what kind of a reception would be given me—my former visit to the bay as a midshipman in H.M.S. *Dædalus*, twelve years ago, having been on a very different errand, and one of the only two Englishmen who had since approached it in peace having been most vilely murdered; but my arrival having become known, my mind was soon made easy by a visit I received the same evening from the Pangeran Badruddin, who came down the river accompanied by all the xeriffs, his sons, and nephews, to welcome me. I informed him that I was not a merchant, and had come to visit him, and, with his permission, to explore the country in the vicinity. The Pangeran promised me all the assistance in his power, and begged me to make his house my residence as long as I chose. "I shall only beg of you," said he, "to allow me, when you return to Labuan, to

accompany you, as I wish to proceed to Singapore on a mercantile visit." To this arrangement I with pleasure acceded. We accordingly ascended the river on the following morning, and I took up my abode with the Pangeran.

There is no necessity to detail to you the conversation I held with the Pangeran: suffice it that I was charmed with his amiability, surprised at the extent of his knowledge of European affairs, and amused at the volubility with which he rattled out question after question upon all subjects. Who built the pyramids of Egypt? What is the population of China? How much did the Sultan of Turkey pay England for her assistance in the war against Moscow? I enlightened him to the best of my ability upon these and a thousand other points, one of which was—What is the cost of the Queen's dinner every day?—and in my turn derived much information from him respecting the neighbouring country.

September 27.—I walked twelve miles to Mausolug, the nearest Dusun village, accompanied by two of my Malays and a party of Dusuns, where I was heartily welcomed. I was much pleased with the inhabitants and their domicile; the men being well built and muscular, the women tolerably handsome, and very different in appearance to the wretched inhabitants of the Limbong, of whom I wrote to you in my former letter.

Their village, containing about 200 inhabitants, consisted of two long houses, like those of the Muruts and Bisayans, with this difference, that they are not so high above the ground and the front is quite open: moreover, everything is kept as clean as a new pin. Having submitted with a good grace to their curiosity—my clothes, my arms, myself, each in turn becoming the subject of animated discussion—the Dusuns then commenced their evening amusements, the men mending their river-nets, carving handles for their swords, tops for their spear-heads,—the women busy at their basket-work. I folded my rug around me about midnight, and from time to time drowsily opened my eyes as a burst of louder laughter struck upon the ear. At what time they retired I know not, but on my awakening on the following morning at early dawn I found my savage friends all up and busy pounding rice for the morning meal, and I am sure the Fellows of the Royal Geographical Society will be amused when they hear that near me were two children playing at cats-cradle exactly as I remember to have played it in my own childhood.

I wandered for more than a week among the mountains to the eastward of Mausolug, and then returned to Bongan, glad enough to get under the roof of a house once more, for the temporary huts

erected by the Dusuns among the mountains were not so impervious to rain as they might have been.

On October 16th I set out, in spite of the rain, on another expedition to the southward, with the intention of reaching, if possible, the Lake of Kinibalu; but, although it was only five days' walk, I found on the third day that the river was so swollen that the fords were impassable, and this, with the fact that three of my men were taken ill with diarrhœa, determined me to put off my visit, until a more favourable season, and content myself with gaining as much information as I could of the country in the vicinity. The name of the village where I was then stopping is Marak Parak, which contains about 300 inhabitants. It was with a sad heart that I turned my face again northwards towards Bongan, which place I reached in a few days, and on the 15th of November left the river and returned to Labuan.

Having given as succinctly as possible an outline of my excursion, I now proceed to give you the information I gathered of the country, and its inhabitants.

Geographically the two ranges of hills which enclose Malúdu Bay enclose also a tract of country extending 23 miles to the southward and 19 or 20 in a longitudinal direction. This is an alluvial district of about 450 square miles, the soil a red earth, composed of detritus of sandstone with decomposed vegetable matter, very favourable to the growth of palms. The Dusuns have a tradition of a time when the sea washed the foot of the mountains at Limbong Batu, where the delta of the Bongan may be said to have its apex. Into Malúdu Bay flow no less than 15 rivers, of which the principal are, the Binkoka on the east, inhabited by Bajaus, where there is coal; the Sugud, inhabited by Sulus; the Bongan, the only one of any length, by Malays; the Malúdu, by Malays; and the Tamiaru, exclusively by Dusuns. The banks of the other rivers are inhabited by Dusuns or Bajaus. The hills, which, rising at the extremity of each cape, gradually, as they approach the apex of the delta, gain an altitude of about 2500 feet, are composed of sandstone and shale, the ridges about 12 feet wide, the sides inclining at an angle of about 45°, in many cases very precipitous spurs of the mountains running out in all directions. From a height their appearance resembles the wash of the sea when the wind is against the tide, on a more extensive scale—ridge rising above ridge, spurs of mountains fouling each other, the whole a heap of confusion. In the delta are two small lakes, one in the neighbourhood of Bongan, two fathoms deep, two miles long, and fifty or sixty, occasionally a hundred, yards broad when the rains have been unusually heavy. The other

is of an oval shape, near the river Landik, two miles its greatest breadth, three fathoms its greatest depth; both are fresh-water lakes. The river Bongan itself, rising in the mountainous region of Kinibalu, is at its mouth not wider than 100 yards, and at full and change the depth is 1½ fathom, which is maintained more than a mile out to sea, when the water deepens, so that small vessels only can enter the river. Within its mouth it is navigable for eight miles. The tide is felt about two miles from the embouchure, and the water is fresh at ebb tide half a mile from it. The mountains on the west of Malúdu are also sandstone. In one hill are masses of iron pyrites. Above Limbong Batu the hills on the left bank are of sandstone, and presented the same appearance as those first described. To the east of them runs the Bongan, here a mountain stream tumbling over the masses of rock that at various times have fallen down the side of the mountains into the river. The valley of the Bongan is from two to five miles wide. Beyond that river are the Natu Hills, beyond which flows the Natu River, which joins the Bongan a little above Limbong Batu. To the west runs the Buam River, which joins the Malúdu a little below. Beyond it the Buam Hills are 2500 feet high.

At Marak Parak I first observed granite, large masses of which lay in the bed of the river, together with syenite, serpentine, and sandstone. The banks of the river, in some places 20 feet high, were composed of a conglomerate consisting of large round pebbles of sandstone, and other stones of the above description, embedded in a hardened clay, now indeed as hard as the stones themselves. This conglomerate was evidently in former ages deposited by the river itself, which has since worked its way into a deeper channel.

The Dusuns brought me pieces of crystal, of mica and of green soapstone, but, as they set a, to me, fabulous price upon them, I did not purchase any.

Marak Parak is situated at the foot of M. Kapokan, 8000 feet high. I did not ascend it very far, but in all probability the granite formation here first shows itself, as, although the base was sandstone, the mountain did not present the same appearance as those of the north. By observations and cross-bearings I found myself much to the east of where I should have imagined the river to run, Mount Kinibalu bearing from me W.S.W. I had thus, as it were, got on the other side of the mountain, as it appears from the sea, and here I received information of the lakes. The appearance of Kinibalu from this vicinity is that of a huge mountain rising abruptly in the west, its crest sloping away gradually to the east, until it is lost sight of behind the tops of the nearer hills. Between

this range and Kapokan runs the river Sabuk. I should think it not unlikely that the principal ridge runs on and forms the peninsula of Ungsang, whilst other ridges, from the common parent, probably enclose the various great bays on the east and to the north of Ungsang.

Here, to my surprise, I found that I was not the first European who had travelled this way, for an old man called upon me one day, and, after some conversation, informed me that he perfectly remembered the fact of two white men from Balambangan coming to Kinibalu. "They could not manage to ascend it," continued he, "but they walked pretty nearly all round it." He informed me that there are two lakes, one halfway up the mountain, from which flow the rivers Bongan, Labuk, Luwanan, Kimbatungan, and Lampasuk, across which a man in a canoe might paddle in half an hour; the other, a very large lake to the south of Kinibalu, with many people living on its shores, and that the lake was salt, which I doubt.

In answer to my inquiry, the person in question said that the people on the other side of Kinibalu were very bad men, and killed every one who approached them. I said I had heard the same account of his fellow-countrymen, and he shook his head in deprecation of such a wicked report. However, there is a feud between the people on the north of Kinibalu and those on the south; also between the first mentioned and those of Mausolug, the place I first visited.

The inhabitants of this region, the Dusuns, or, as they are also sometimes called by the Malays, Idäan, are, for the most part, a fine, well-made, and not unhandsome race; the men muscular and well developed; the women, when very youthful, positively pretty, except their black teeth, but those above the age of 20 are worn out with the hard work assigned to them, pounding padi and carrying wood and water. Their dwellings are similar to the long houses of the south, except that the front is more open, as they are not afraid of the invasion of their hereditary enemies, the Dusún Tamis, living on the south side of Kinibalu. They have no written language, nor idea of time beyond the return of the seasons, and they know not even their own age. They have not, so far as I could discover, any religion, but they revere the name of Kina, their first leader, who having brought them to this land from another, ascended the mountain Kinibalu, and was no more seen of men. They also kept in remembrance the name of Hungsum-ping, the brother of the Emperor of China, and Malekbatata, from the same country, whose names are connected with a curious legend.

I could see no similarity of features between this race and the Chinese, except that in childhood the upper eyelid is turned in, so that the eyelashes appear to protrude from the eye itself. There is also a peculiar feature which assimilates them to the negroes of Africa, viz. the protuberance of the shin-bone, which in children is slightly arched outwards—a peculiarity which, with the first mentioned one, disappears with years, for the limbs of the young men are as well proportioned as a Spaniard's or an Irishman's. The taboo is also practised among them. The cases which came under my observation were, that of a house in which lay a dead body; and another whose inmates had had a great sowing of padi. Doubtless there are other causes of taboo, of which I am at present ignorant. These people do not preserve the heads of their enemies, and the only parties among them who tattoo are those who have killed an enemy. The tattoo is invariably a broad band from the navel up to each shoulder, where it ends abruptly. A smaller band is carried down each arm, and a stripe drawn transversely across it for each enemy slain. I am happy to say I saw but few men tattooed, but one young fellow had no less than 37 stripes across his arms. Upon my inquiring as to where he had been so fortunate, he pointed towards the river Labuk. There appears to be no particular disease prevalent among these people. Very few were affected with skin disease; no appearance of smallpox, and, although the Malays of Bongan were nearly all suffering from weak and inflamed eyes, I did not observe one instance of this distressing affliction among the Dusuns. A few cases of consumption came under my notice both among the Malays and Dusuns. With regard to their numbers, if the whole district is as thinly peopled as the parts I visited, there cannot be more than 12,000 in the whole tribe or nation. How it is that, with a well watered country, a healthy climate, peaceful occupations, and a perfect independence—for their freedom, unlike that of the Dyaks of the south, is not at all affected by the proximity of the Malays—they have not increased and multiplied to a greater extent, I am at a loss to conceive.

The language spoken by the Malays of Malúdu Bay differs a little from that spoken at Bruni, many words being borrowed from the Sulu—such as timus for garam, salt; piasan for kalapa, cocoa-nut; and others—while the pronunciation differs in these respects, that the sound ch is always pronounced s—as in kuching, a cat, which becomes pusing. Here, also, the Orang-utan (which is very common) is known by the name so familiar to English ears: the word "meias," given by Sir J. Brooke as the name of this ape in the languages of the Durgahis of the north-western coast, is not

understood by them. The language of the Dusuns sounds at first, from the frequency of words having the accent on the last syllable and not as usual in Malay on the penultimate, unpleasant from its roughness, but after a little while it is not unmusical to the ear. Some words are identical with the Sulu, many with the Malay, and others very similar to the latter. The prefix "meng" is common in their verbs, even when the words are different from Malay. I did not remark any affix such as are frequent in the latter language.

In their social institutions the Dusuns or Idäan are cleanly in their habits, and their dwellings are neat and tidy in the interior.

I was present at a birth, a marriage, and a death. No ceremony took place on these occasions, but after the birth, the mother died in a few hours from hemorrhage and exhaustion. When there was no doubt of her being in a dying state, she was brought out of her little cabin, and laid in the general long room or verandah, where all the people gathered round her and commenced a howling chorus which emulated that of a troop of their own dogs, and which was continued until the spirit had fled. The marriage I spoke of was performed by torch-light; a hog was killed and a feast held, after which a chorus was sung by all the women and children for several hours, which was really very pretty, but of its purport I am ignorant, and the happy couple were at length dismissed with loud acclamations.

Concerning the produce of the country I can say but little. Rice of a good quality is grown on the slopes of the mountains. Of fruit there was but little, the cocoa-nut, jack-fruit, mango, and banana, with a small durian, making, I believe, the sum total, and these in but small quantities. Of vegetables, the small sweet potato and the onion mark the beginning and end of their knowledge. Tobacco of an excellent quality, and highly esteemed by the Malays, is grown in larger quantities than nearer Bruni. The forests produce a little camphor and a little bees'-wax, much damar, two kinds of gutta-trees, and perhaps even more, caoutchouc, rattans of great length, and probably many more useful commodities which my want of opportunity prevented my observing.

I am not prepared to say anything definite on the subject of trade at present, except that I have met in the course of my journey in the north many native traders and others from the eastern portion of the Archipelago. My next trip will probably be to some of the rivers on the eastern side of Borneo, and on my return I trust to be able to communicate to the Society some interesting information. If I had but a gun-boat, or, better still, such a steam-boat as they

have built at Bristol, in two parts, for the Australian rivers, I might defy a fleet of pirates, with which those seas are now more than ever infested; but in my poor, defenceless, crazy old prahu, I confess I look forward to the day of my return to Labuan with some little degree of anxiety.

I enclose a map of the country I traversed, for the information of the Society.

I remain, &c.,

C. A. C. DE CRESPIGNY, R.N., F.R.G.S.

The PRESIDENT.—I am glad to see you applaud this communication, because when our young friend, Lieut. De Crespigny, started upon his most perilous adventure he certainly undertook an enterprise which seemed almost Quixotic, for he received scarcely any assistance, and had merely permission to travel from the Admiralty. He had, however, the goodwill of the Society and our "Hints to Travellers." Now, without knowing anything of the interior of this vast country, of which, indeed, geographers were entirely ignorant, this Lieutenant of her Majesty's navy undertook to explore this remote region, and I think you will agree with me that he has exhibited the spirit of a true geographer, and that we ought to thank him heartily for his communication.

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3. *Account of an Expedition from Damara Land to the Ovampo, in search of the River Cunene.* By MESSRS. GREEN, HAHN, and RATH.

A LETTER from the Rev. C. Hugo Hahn, dated Barmen, October 7, 1857, has appeared in the 'Cape Town Commercial Advertiser,' describing the disastrous issue of a journey taken by himself and his colleague the Rev. Mr. Rath, together with Mr. F. Green, from Damara Land to the Ovampo, in search of the River Cunene. A published letter from the latter gentleman has also been received.

The missionaries pursued the track of Mr. Galton and Mr. Andersson as far as the Omoramba K'Omanbonde, where they left it and followed the river bed. After a few days they unexpectedly met with Mr. F. Green, who also wished to travel to the Cunene, and who informed them that the Omoramba ended abruptly, about 40 miles farther on, in a sandy soil. Consequently the two parties joined together and proceeded northwards. They ultimately fell in with another river-bed running N.W. (I believe the bearings to be magnetic) and they followed it. This brought them unexpectedly to a small lake situated about 32 miles E.S.E. of the Etosha salt pan. It was well stocked with flamingoes, pelicans, and other water-fowl, and its circumference was judged by Mr. Green to be 20 miles. It is called Onondova, is occupied by Bushmen tributary to the Ovampo, and is the frontier of the pasture-grounds of Ovampo land. Mes-

sengers were sent from Onondova to Nangoro, the King of the Ovampo, asking permission to visit him, and a travelling party of Ovampo were afterwards met, whose leader undertook to conduct them to his village, saying that it was his special office to introduce strangers.

On entering Ondonga, the fertile district of Ovampo land, they were met by one messenger after another, sent to them by Nangoro, and were received cordially and respectfully by the people. The caravan consisted of 4 waggons and 100 loose oxen, besides those yoked to the waggons, and about 30 Damaras. Just before reaching Nangoro's house their guide told them that the king desired their assistance in an expedition against a small neighbouring tribe with whom he was at war. At this request the missionaries were surprised and disgusted, and refused indignantly. The guide took it very quietly, and immediately allowed the subject to drop; but, from that moment, there was an evident change in their mutual relations. Nangoro would not see them for five days, and when he did so he gave them a cold reception and flatly refused to allow them to proceed farther. Mr. Green's account of their reception in Ovampo land is as follows:—

"The guide appearing a frank and honest fellow, we gladly placed ourselves under his directions; and as he was very communicative—added to which, a shrewd character—we became rather disposed in his favour. Upon our arrival at the chief's residence, he appeared to be a complete master of ceremonies; our messages, together with our presents, were delivered by him, and the custom of lighting our fire from that of the chief's hearth was strictly attended to and executed with a little skill of witchcraft by him. Our first present was returned, with a message that whatever we intended to give his royal highness, besides the beads, must be despatched at the same time. We became exceedingly annoyed at his impertinence, and told him very plainly that it was our custom to send presents in that way, and he must conform to it; that in sending the present back he did not appear to be on friendly terms with us, and we did not like it; that if we had anything further to give the chief, we should do so after we had the honour of seeing him, 'if his words were good for us;' if not, we should not give him anything more. I was determined not to allow myself to be imposed upon by this beggarly chief, which was also the same in Mr. Hahn's case. (Mr. Galton allowed himself and party to be sadly imposed upon by Nangoro, which induced the latter to make a like attempt upon us.) This returning of presents was at length amicably settled, but we had occasion to be exceedingly angry at the non-appearance of the chief; after we had been at his town for three days, and sent a message to inform him that we were not accustomed to wait the pleasure of a chief so long, and that if he did not come the following day we should inspan and ride away—also, that if he considered himself a great chief, then so did we. This message appeared rather to astonish his highness, and we shortly received a reply, that we must not imagine that it was done with any evil design, but it was a custom from the day he was born, and that he would come and pay his respects the ensuing day. He kept his promise, and we were not sorry when we were rid of the company of this fat old man."

Many incidents occurred while the party was encamped near Nangoro which aroused suspicion and great alarm, the Damaras were exceedingly afraid, and appeared in momentary expectation at all hours of the night and day of being surrounded by the Ovampo and massacred; but no overt act was committed until the party prepared to leave:—

"On the morning of the 30th of July we yoked in the oxen at daylight, and made a start just as the sun was making its appearance above the horizon. To guard against their opposing our exit from Ondonga, our caravan was arranged as follows:—the loose cattle and donkeys were kept in advance, under an escort of all the available Damaras; after which came the four waggons, that of Mr. Hahn bringing up the rear. As I still retained a horse, I was mounted, and continued with the cattle in advance. We had not ridden many hundred yards when a party of the Ovampo came running from the direction of the chief's village; one of the sons of the latter asked both Mr. H. and myself if we were going, to which we replied that we were; shortly after, the 'war cry' resounded on all sides. Some made a rush forward for the road to bar our progress."

Mr. Hahn went unarmed to one of Nangoro's sons whom he recognised in the crowd and expostulated with him. This had a slight effect in checking the demonstration, but shortly after there was a cry, and Nangoro's son had driven his assegai through the back of one of the Damaras; the poor fellow dropped, but as he fell he fired off both barrels of his gun, killing an elder son of Nangoro and another man, besides wounding his murderer. This was the critical moment. Mr. Green says—

"I rode forward to meet one man, more daring than the rest, who was stealthily approaching with his javelin quivering in his hand; I suddenly dismounted, and, whilst he sat thinking to escape the bullet, with a well-directed and steady aim I shot him; and the words 'blood for blood' rested on my lips. It was the first fellow-creature I had ever killed. There remained nothing more but to fight for my life, and that of the people I had brought into danger—and I was determined to sell it dearly."

About noon the Ovampo had desisted, and Mr. Hahn having most fortunately heard, only the night before, that uninhabited plains might be reached at no great distance in a S.W. direction, that course was adopted; and ultimately, after a forced march of 3 days and 2 nights making a wide circuit, they reached the Otjihako wa Motenya utterly exhausted. The missionaries appear to have reached Barmen without further disaster, and Mr. Green dates his letter from the shores of Onondova, the new lake.*

A letter of Mr. Ch. J. Andersson has also been received, in which he announces his intention of himself starting for the Cunene. He

* Mr. Green's courage and skill as a marksman contributed greatly to the repulse of the Ovampo; and Mr. Hahn's testimony to his services is most cordial and unreserved.—ED.

adds that he is wretchedly equipped, but that rather than lose the season he will start at once.

MR. GALTON, F.R.G.S.—I must express great regret at the tenor of a large part of this account. I quite gather from Mr. Green's letter that he adopted a domineering tone towards the Ovampo, which I believe to have been eminently injudicious, to have been construed by them as a menace, and to have been resented in the way we have heard.

In passing judgment on the conduct of the Ovampo, we must try and place ourselves in their position. Their territory is visited, almost invaded, by a strong party of foreigners, who are judged to be kindred to the Namaqua chiefs from their colour, language, creed, and intermarriages; and the Namaquas are a race of marauders, who have lifted cattle from the very borders of Ovampo land, and are known to be awaiting a favourable opportunity for invading that country. These foreigners are fully armed and dictatorial in their ways; they refuse to give those presents which are well described as taking the place of customs duties in African nations. They show scant courtesy to the king, and they very probably trespass in not a few of the many requirements of a witchcraft ceremonial. Why, if such a thing could be imagined as that 30 or 40 headstrong Englishmen were to make a sudden descent upon the shores of a continental power, at a time when war seemed to impend, professing peace but armed to the teeth and ready to fight, unfurnished with any kind of credentials, violating quarantine laws, setting all authority at nought, and coming for no conceivable purpose except that of making an armed reconnoissance, I presume they would have been treated by the nearest inhabitants or military guard in a not less hostile manner than this exploring party has been by the Ovampo. As to the treachery of which complaint has been made, I do not see that it is proved, for the expedition was treated with little favour. Or, even if it were proved, that it would make the attack much more difficult to excuse. Treachery is not so black a crime in the morale of African nations as it is in our own; we must also recollect that it is a last resort of the weak against the strong, such as the Ovampo suspected they might be before the much dreaded guns of their unwelcome visitors.

Mr. Green remarks that I was imposed upon by Nangoro in the matter of presents; but, on reading his list of gifts, I find I do not deserve the credit of having been so liberal as himself, yet I had the good fortune to conciliate where he had not, and I was able to leave, in peace, the happy country of a noble and a kindly negro race, which has now, for the first time, been confronted and humbled before the arrogant strength of the white man.

MR. MACQUEEN, F.R.G.S.—Mr. Hahn, the missionary's account is chiefly valuable on account of the considerable fresh-water lake that he discovered, and which he places in 18° 45′ S. lat. and 17° 30′ E. long., which is probably not incorrect. The lake is fresh water with plenty of fish. In circumference it appears to be about 30 miles, but to the W. no shore could be seen. Nearly in this portion of Africa all the old geographers place a lake. As the dry season was far advanced when Mr. Hahn saw it, it probably never dries up, and may be considered to communicate with the river that joins the Cunene to the N. of Ondonga, the capital of Ovampo, ruled by Nangoro or Nangolo. This chief bears a very bad character amongst all his neighbours to the N. and N.N.E. He treated Mr. Hahn very ill, and attempted to murder him and all his party after they left his capital. But they fortunately made their escape after the loss of some of their party.

The lake in question is situated about 30 or 40 miles N. of the junction of the rivers Omoronda and Omorabondo, which contain little water in the dry season. Both these rivers are mentioned and delineated by Mr. Galton, and Mr. Hahn mentions another river also called Omoronda lying considerably to the E. of the last named Omaronde, and which he says runs E.N.E., and forms

the Tioghe. This is not improbable, as a water-parting seems to run from 18° to 19° E. long., in this portion of Africa which separates the waters which run into the Atlantic from those that run eastward to the Liambaye or Liambige and the Indian Ocean. Vast copper mines are found about 100 miles E.S.E. of the lake mentioned, and the carriage of the ore forms a great trade to the people of Ovampo.

The intention of the party was to proceed N.E. to a place or chief named Libele, whose abode is to the S. of Bunda in about 16° S. lat. and 21° E. long. In this portion of Africa snow is stated to be found on high mountains in July and August. In the direction alluded to they expected to reach the Cunene, but which they never could have done, as the meridian of the upper part of that river is in about 17° E. long. Their course would have carried them across the Cubango, and its tributaries which form the Chobe, a great feeder of the Liambige. But they durst not venture to proceed from Ovampo in that direction, as at that season of the year water cannot be found for a great distance. Brocheda and Ladislaus, who both visited this district, the former in 1849 and the latter in 1852 and 1853, tell us that this district of Africa between Ovampo and the Cubango, including the great state of Quanhama on the S.W. side of that river, and called also Aimbiri from the name of the chief, is very dry in the dry season of the year, and generally a plain or level table-land with scarcely a stone to be found in it. Copper and iron are most abundant throughout it, and good water is frequently found in very deep holes, the remains of the floods in the rainy season from November to April, when the rains are very heavy. Both Brocheda and Ladislaus mention the great river Liambaye or Liambige running to the eastward, and that the country in that part of its course had been overrun and conquered by the Makololo, or as Brocheda, perhaps by an error of the Portuguese press, calls them, the Maka-kotto. The population of the portion of Africa here specifically alluded to are represented by traders and travellers who have visited them as extremely rude, ignorant, and barbarous.

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4. *Journal kept during the performance of a Reconnoissance Survey of the South District of the Province of Otago, New Zealand.* By J. TURNBULL THOMSON, F.R.G.S., Chief Surveyor, Otago.

IN the beginning of 1857 Mr. Thomson explored, in successive trips, the southern extremity of New Zealand, travelling on foot over 1500 miles of difficult country, carrying his theodolite and "swag" of clothes on his back, and driving pack horses laden with flour.

The epitome of his results is contained in the following Table.

Nature of Country reconnoitred between the Waiau and Matuaru Rivers, and the Umberella, Eyre, and Takituno Mountains.

	Square miles.
Forest land	570
Moss and swamp	108
Agricultural	400
Pastoral	2150
Barren (mountainous)	500
Total	3728

POPULATION.	
Europeans	253
Half-castes	70
Maoris	119
Total	442

There is also a table of barometrical altitudes and a comparative vocabulary of Maori and Malay words. Numerous latitude observations are alluded to, but do not appear in the present paper.

A large part of the country traversed, was utterly destitute of man; the white race not having reached so far, and the aborigines (the Maori) having abandoned it. There are marks of the previous existence of the latter in numerous small ovens scattered about the country; those that are on the skirts of forest land were usually found complete and apparently recent, those that are in the open country were broken and very old. Mr. Thomson remarks that natives would always build their ovens where wood was abundant, and argues that there has been a gradual diminution of forest land, and that ovens have been successively built on the borders of the forest as it gradually receded. Now the edges of the forest are choked with scrub grasses and ferns, which, on being set fire to, burn vigorously, destroying to various depths a fringe of the adjacent trees. In about three years' time, grass takes the place of the burnt scrub; scrub ultimately takes the place of the burnt forest; and thus the forest has a constant tendency to retrograde where fires are frequent, either from accident or design.

Other marks exist which have frequently been ascribed to the handiwork of aborigines, but which our author traces to an entirely different source. They are small mounds, sometimes heaps of stones, with little or no earth, which are scattered promiscuously about the country. On one side of them, is invariably a hollow. He attributes them to fallen trees, that have uprooted a large quantity of earth, which is left as a heap after their complete decay, the rains having washed out more or less of the earth and left the stones where they were. The hollow is the place where the root formerly stood.

There is much grandeur in the scenery of the part of New Zealand traversed by Mr. Thomson. The higher course of the Matuaru, its fall, and the Dome Mountain are especially mentioned. The Dome is only 4505 feet high, but it commands a grand and extensive view from the eastern to the south-western coast, and embraces the serrated edges of the Eyre Mountains, covered with snow. The height of the snow-line is not mentioned, but on Mr. Thomson ascending the Dome, and also an adjacent peak of much the same altitude, on the 15th of February (corresponding to our 15th of August), when the day was a hot one on the plains below, water froze during the time he was making his observations, in the one case at 10 A.M. and in the other at noon.

Mr. Thomson has collected some facts, which give hope that the

great bird, the Moa, may yet exist. Between the Waiau River and the West coast the country is covered with forest up to the snow line. It is a tract of 100 miles N. and S. and 50 miles E. and W., and here, and here only, are there hopes of finding live specimens of the gigantic bird the moa; and considering the very recent indications of its presence, everywhere found in the vicinity, the supposition of its existence at the present time, at least, has grounds for entertainment.

Jacob River settlement deserves some notice. It formed one of the many whaling stations that formerly studded the coast of New Zealand, and is now probably the only place where whaling is still carried on. Twenty or thirty years ago, when whales were numerous, vessels came here from Sydney and Hobart Town, but owing to the savage character of the natives, the captains of the ships kept as much aloof from them as possible, and selected stations that were naturally safe from sudden attacks. Codfish Island was the best of these; it is situated in a stormy sea, with only one landing place, and in a convenient position for whaling and sealing.

The natives of the coast, and of Centre Island and Raupuki, were 3000 to 4000 in number, and warlike as they were, were nevertheless inferior in strength to the northern tribes, who made constant raids upon them. Consequently they were driven to the islands from motives of fear similar to those which made the whalers select Codfish Island as their station. Friendly relations and intermarriages between the whites and the aborigines soon followed, and, as a fruit of their mutual confidence, the white man began to extend the scene of his enterprises along the coast, other settlements were formed, and Codfish Island fell into secondary importance. These new settlements were The Bluff, New River, Waikawa, Jacob River, &c., and they all flourished so long as whales continued plentiful. But a change took place, the whales were nearly exterminated and the remainder deserted these waters. The native race declined rapidly in number; measles alone swept off two-thirds of them, and other imported diseases were very destructive; at present the natives of these parts do not exceed 400 in number.

Centre Island is deserted; a few natives live scattered among the settlements, but the principal remnant is at Raupuki. As to the Europeans, such as had not contracted ties with the natives removed elsewhere, the others eked out a dull existence; their native wives tilled the ground, and now and then a ship called, ready to exchange tobacco, &c., for potatoes and fresh pork. Such was the condition of this part of New Zealand, until within the last two years, when

the purchase of the country from the aborigines opened it out to civilization. But Jacob River was an exception: it had been kept from the fate of the other settlements, mainly owing to the energy of Mr. Hanwell, who imported stock from Australia, sent whaling and sealing expeditions to the almost unknown West coast of New Zealand, and encouraged such branches of industry as were available. The inhabitants are now remarkably thriving. Mr. Thomson draws a close parallel between the present condition of Jacob settlement and that of the Shetlands many years since, as described by Sir Walter Scott; there is the same seclusion from a more stirring world, the same pursuits and the same social condition. The west of New Zealand is the scene of their whaling and sealing enterprise; its coast is remarkably stormy, but sounds and promontories alternate in such close succession that harbours of refuge are everywhere to be found. The water is exceedingly deep close in to shore, and vessels frequently moor to the trees, where they are securely protected from wind by the steep cliffs. The natives of Jacob's Town profess Christianity; they dress and build cottages in European fashion, and these, by the way, are remarkably tormented with fleas.

Finally, Mr. Thomson draws a humorous comparison between the occupations and way of living of an officer on the Indian survey (in which he formerly served) and those of his present employment. Notwithstanding the rude work of the latter, he considers the health and hearty enjoyment of life to more than compensate for the absence of luxuries, from which the languor of an Indian climate had removed the zest.

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5. *On the Fine Regions of the Trade Winds.* By THOMAS HOPKINS, M.B.M.S., V.P. of the Manchester Literary and Philosophical Society.

MR. HOPKINS' paper is a sequel to other writings,* in which he has proposed a new theory upon the causes of trade winds and monsoons. It is not specially explained in the present communication, but as it is alluded to, throughout its pages, a concise description of it becomes necessary. Mr. Hopkins denies many of the facts usually quoted in support of the commonly received Hadleian theory; he adduces others, which he considers to be at variance with it, and maintains that the prime mover of these atmospheric phenomena

* *See* Journal of the Royal Geographical Society, vols. 26 and 27; and Transactions of the Royal Society.

resides in the influence of certain vast mountainous tracts, which produce an indraught of air from all sides, owing to causes we will proceed to indicate. These mountainous districts condense the moisture of the air that impinges upon them in large quantities, and Mr. Hopkins considers that condensation of moisture lightens the air, and therefore causes it to rise, for two distinct reasons: the one, that it has become specifically lighter owing to its loss of water; the other, that it is warmer, and therefore more rarefied, than other air at the same elevation as itself, owing to heat given out by the act of condensation. If these postulates are acceded to, it follows that we have a system of ascending currents, an indraught of winds to feed them, and a consequent escape and overflow of dry air in the higher regions. The present paper suggests, rather than undertakes an enquiry into the localities, where the dried air again reaches the earth in fulfilling its circuit.

"The best evidence we have of the immediate source of the air in the trade winds of the Pacific is to be found in its degree of dryness. All accounts represent them as being at first, and to a considerable degree, accompanied by a clear sky, but I have met with no register of the humidity of the air. The researches that are now in progress by Americans, as well as English, to improve our knowledge of nautical geography will probably give fresh information; but it is particularly desirable that there should be registrations of the wet and of the dry bulb-thermometer in the parts treated of. If we were in possession of such registrations over a few lines of the Pacific from E. to W., a fair inference might no doubt be arrived at respecting the sources of the great masses of air which constitute the trade winds of this ocean."

Quotations are then made from various well known authors, Dana, Melville, and Darwin, to show the extent over which the fair weather of the trade winds extends, both in the Pacific and the Atlantic.

Over both these oceans Mr. Hopkins considers that the currents in the higher regions pass in an opposite direction to those below, but that elsewhere, as in the Indian Ocean, the case is probably different.

"It is not necessary that we should presume that the air which descends in a fine locality has come from the terminus of the same wind that it feeds. The proposition is that air which has been dried by condensation of some of its vapour, in high regions, descends in some other parts to the lower regions as dry air, making the locality fine, but it does not follow that it must descend to feed the *same* stream that had furnished it."

"Condensation of vapour, by irregularly disturbing the atmosphere at various heights, puts the air in motion at those heights, making it ascend in one part, and it must come down in another. Some of the areas of ascension have been described, and a few of descent, but there are innumerable others spread over the surface of the globe, every hill or place, where heavy rain falls, being to some extent an area of ascent, with the wind that blows towards it coming directly or indirectly from a region of descent. The whole aerial

ocean to a considerable height is thus kept in a state of motion and change, and the invisible elastic vapour which is sent into the atmosphere by evaporation, in one part, comes down as rain in another. The different quantities of vapour condensed in equal times in different localities, and the elevations at which the condensation takes place, modify the movements of the air in various degrees, and in all conceivable ways, but the nature of the processes is always the same."

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6. *On Dr. Rink's Remarks respecting the supposed Discovery by Dr. Kane of the North Coast of Greenland and an Open Polar Sea.*

The PRESIDENT.—I have, Gentlemen, now to call your attention to a subject which, although at first sight it might appear untoward to the American gentlemen, Mr. Poor, Professor Alexander, and any others who may be present, will, I have no doubt, when properly explained, satisfy them that the feeling of vexation which has been expressed at New York, has solely arisen out of an inaccurate newspaper account of what took place at a former meeting of this Society. You will recollect that at the meeting of this Society in April a paper was read, as sent to us by Dr. Henry Rink, the Danish Lieutenant-Governor of South Greenland—a gentleman extremely well acquainted with the glaciers of that country. In that paper, whilst making some comments of a critical character on Dr. Kane's work, he questioned the accuracy of the determination of the extreme north latitude fixed by Morton, one of Dr. Kane's party. Upon that paper being read, two of our distinguished Arctic explorers, Sir George Back and Captain Collinson, made observations which led to a conviction on the part of Mr. Arrowsmith and the practical geographers who had studied the subject, that the extent of northern latitude claimed by Dr. Kane, on the observation of his steward Morton, must be reduced.

Upon that subject I will request the Secretary to read a letter from Professor Bache, who completely justifies the main conclusions at which our nautical men had arrived. In fact, the only difference between them and the Professor amounts to some seven or eight miles. Now, if that is all the difference existing between the American version and our own, it is surely undeserving of attention.

My chief object, however, in calling attention to the case is to state that throughout all the observations made on the former evening, not a single individual disparaged in the slightest degree the great merits of that illustrious traveller, Dr. Kane. We all truly admire him; and during the short period he was amongst us, every person who saw him, loved him. We gave him our gold medal, have done him all the honour in our power, and, having striven to record our high sense of his great and noble achievements, it was impossible that *we* should disparage his merits.

Mr. Jay, in his letter to myself, uses words employed in a newspaper. Now, I must declare from the chair that that statement is most inaccurate. Had the statement been correct, our American friends would have had reason indeed to be offended. Dr. Shaw will now read the letter of Professor Bache addressed to the Hon. G. M. Dallas, the American Minister :—

Washington, W. C., May 6, 1858.

MY DEAR SIR,—As desired in the note addressed to you by Dr. Norton Shaw, under date of April 13, 1858, I have caused an examination to be made of the data for Morton's northing in the expedition in which he saw the open Polar Sea. I selected for this

purpose Charles A. Schott, Esq., Assistant in the Coast Survey, who was chosen by Dr. Kane to reduce many of the results of his observations, and who is very exact as a computer, and has remarkably good judgment in regard to data.

Dr. Kane states in his 'Narrative of the Second Grinnell Expedition,' Appendix V., vol. ii., that the positions given to Cape Jefferson by dead reckoning and by astronomical observations differ by 43'·6 of latitude, and that he had adopted a mean of the results by the two methods, instead of that given by either method singly.

Mr. Schott reports that, "After verifying the astronomical data of Capes Jackson, Madison, and Jefferson, they were plotted, and the shore line run in accordingly, supported by some available bearings. From Cape Jefferson the bearing to the northernmost cape reached (Cape Independence) is by compass N. 148° E. or N. 40° E. true, distance 17 nautical miles. Consequently, if we base the shore line on the sun's meridional observation, and not upon the mean between the dead reckoning and the astronomical observations (as Dr. Kane has done, and so stated in his 'Table of Positions,' Appendix VI.), we trace the shore line as shown in red ink on the accompanying sketch, and Morton's greatest northing (at Cape Independence) becomes 80° 53' (81° 12' by chart in vol. i. of the 'Narrative').

"That Dr. Rink has deducted too much by placing Cape Constitution in 80° 44', and hence Cape Independence in 80° 41', is plain from the fact that Morton observed the sun in 80° 41' at noon at Cape Jefferson, a point nearly 12 miles to the south of Cape Independence.

"Believing the astronomical observations to be entitled to greater confidence, 80° 56' for the latitude of Cape Constitution should be adopted in preference to 81° 15', as given on the chart in vol. i. In no case, however, could a latitude lower than 80° 53' be assigned to it."

The conclusions in regard to the open Polar Sea do not depend in any way upon this difference.

With great respect and regard,

Very truly yours,

Hon. George M. Dallas,
Minister of the United States to Great Britain.

A. D. BACHE.

CAPTAIN COLLINSON, F.R.G.S.—I am particularly glad that this subject has been amicably adjusted. As geographers we must pay attention to observations, and not to reckoning. A Flemish yard or a Dutchman's foot is of no value in

estimation when we can fix a geographical position from astronomical sources. Professor Bache's letter suggests a point as the farthest limit of Morton's journey, which differs so slightly from the conclusions we have arrived at, that there is no necessity to raise a discussion about it. But I should like once more to pay a tribute to the memory of that noble man who we may almost say sacrificed his life in order to rescue our fellow-countrymen (hear, hear); and I am sure you will all join me in this mark of respect to Dr. Kane.

The PRESIDENT.—I would observe that the remarks had reference only to the supposed imperfect observations of Morton, the steward. The whole question turned upon that point, and had no reference to what Dr. Kane himself had observed. I ought to have mentioned that, in consequence of the inaccurate report in the newspaper, the Geographical Society of New York passed a resolution instructing Mr. John Jay, their Foreign Corresponding Secretary, to ask this Society to favour them with a copy of Dr. Rink's paper, and also of the remarks of the gentlemen who took part in the discussion.

Now, as Mr. Poor is present, I can assure him that he will obtain the fullest explanations from the gentlemen who did speak on that occasion, as well as a copy of the paper that was read; and I hope that he will return to his own country with the assurance that there was nothing said or imagined which in any way reflected on the truthfulness and ability of Dr. Kane.

PROFESSOR J. H. ALEXANDER, of the United States.—It was only a few moments ago I was made aware that this subject was coming up. Therefore, I am not acquainted with the facts except as they have been mentioned to the meeting. I can only say as an American, in which character you, Sir, have done me the honour to call upon me, that the expressions of Professor Bache, the hereditary friend of Dr. Kane, as I may be claimed also to be myself, seem to me to cover the whole question. In the first place, it should be borne in mind that Dr. Kane was not an astronomer and geographer by profession, but a physician in the United States navy. The impulse of his own feelings and love for science carried him in this direction, after having led him first very far south in Mexico, where he made explorations which did not yield in adventure and interest to his voyage to the Arctic regions. The same impulse bore him to the north, but without the precise technical education which would make his observations entirely reliable. Therefore, if he did make a mistake as to a distance of a few miles, I do not think it a matter of very great importance. The great merit of Dr. Kane—the merit which we as Americans principally recognise—is the animus, the disposition he showed (hear, hear), and the great general results he gave us in extending our knowledge of the geography of that great Arctic region. Further than that, I would say it appears to me, as a man of science, in which character you have also referred to me, though I have very small claim to it, and at most can only ask to be considered as a *lover* of science, that the claims of science are not bounded by any country. Science requires precision when she comes to details and observations, whether made by Americans or Englishmen. Therefore I am happy to see that, after the judicious and fair sifting which these observations of Dr. Kane have undergone, no greater error has been discovered, so that any of us, should we be inclined to transport ourselves to those inhospitable regions, may now rely upon being never out of our reckoning more than a few miles.

I think, finally, that there is every reason, on the part of Americans, for being more than satisfied with the just and kind manner in which your Society has treated the whole affair.

The PRESIDENT.—I ought lastly to mention, to the honour of our kinsmen on the other side of the Atlantic, that, not content with having done so much in the search after Franklin, they now, on the proposal of Dr. Hayes, the companion of Kane, contemplate a further expedition to ascertain whether

there is or is not an open sea beyond Smith Sound. As geographers we cannot too warmly thank them for the spirit they have displayed in this Arctic subject.

Before adjourning the meeting the President announced that, by the desire of the Council, he would again apply for the permission of the Senate of the University of London and of the Council of the Royal Society to hold the meetings during the next session at Burlington House.

ADDITIONAL NOTICES.

1. *Extract from Notes upon the Passage up the Peiho with Lord Macartney in* 1793. By Captain PARISH, R.A. With a Chart of the course of the river, printed on a reduced scale in Sir George Staunton's Account of the Embassy, and lately republished by the Hydrographical Department.

Communicated by Sir WOODBINE PARISH, K.C.H., F.R.G.S.

ABOUT the end of the month of July, 1793, H. M. S. *Lion* and the *Hindostan*, a large East Indiaman, attended by three small brigs, arrived with Lord Macartney and the British embassy off the Peiho River, in the Gulf of Pe-che-li. The depth of water not being thought sufficient to justify a nearer approach of the large ships with safety, they were anchored at a distance of 15 or 20 miles from the land, one of the brigs being sent in to communicate with the Chinese authorities, who were no sooner apprised of their arrival than they sent off supplies of all things needful for them, and junks without number to facilitate their landing and farther progress. It took some days to transfer all the heavy baggage and valuable presents for the Emperor, when, all being ready, the ambassador himself, with the gentlemen of his suite, went on board the brigs, and, accompanied by a swarm of Chinese junks, with a fair wind and tide, accomplished the entrance of the river without difficulty; and, after crossing a bar which lies off its mouth with only 7 or 8 feet water over it, ran up it some little distance, and were landed at a little town called Ta-coo, where the viceroy of the province was waiting to receive them with all honours.* At Ta-coo they went on board some passage-vessels prepared by the Chinese for their reception, described as being very conveniently fitted up for their accommodation—very high out of the water, and, although 70 or 80 feet long, of such light construction as not to draw more than 18 inches when all were on board. In these vessels it took them two long days to reach the city of Tiensing, a distance, according to Captain Parish's calculation by the course of the river, of about 85 miles from its mouth, although in a direct line not more than half as much.

Tiensing is situated at the confluence of the Peiho and Euho, or Yung-leang-ho (the grain-bearing river), so named from its being the channel by which the greater part of the supplies for the consumption of the capital are brought from the southern provinces through the Grand Canal, and the many

* *See* Journal of the Royal Geographical Society, vol. iii. p. 304.—ED.

rivers which, in connexion with it, form a continuous chain of inland navigation from the most southern parts of the empire. This city is, in fact, the emporium, and may be called the port, of Pekin. The concourse of vessels was so great for two or three miles abreast the city, that it was with difficulty the junks with the embassy on board were able to pass through them. The population was said to be 700,000, all seemingly as busy as a hive of bees.

The course of the river as far as Tiensing runs nearly east and west, and is very winding, as will be seen on reference to the chart; above Tiensing it runs nearly north and south. Near *Yung-Swin*, about 30 miles above Tiensing, the river becomes more shallow, and the tidal action ceases, from which place the junks had to be towed against the stream for the rest of the way to Tong-chou, distant by the river from Tiensing about 95 miles, or from its entrance about 180 — in a direct line perhaps not more than 90 or 100 at most. The operation of towing was performed by gangs of men of fifteen or twenty for each vessel, according to its size, who ran along cheerfully, singing as they went—stout, sturdy fellows collected for the occasion. The vessels passing up the river above Tiensing seemed innumerable—chiefly with cargoes of grain and salt for Pekin.

They reached Tong-chou on the fourth day after leaving Tiensing, and shortly before arriving there, had a view of the mountain ranges of Tartary in the far distance, stretching across the horizon from east to west. So far the country on either side, as far as the eye could reach, had been one vast flat, for the most part low swampy grounds, cultivated in the vicinity of the towns and villages with rice and millet, and studded with willow-trees. The banks of the river appeared in several places to be considerably raised above the level of the adjacent lands, and great care was observable to strengthen them against breaches by any flooding of the waters. In some places sluices were noticed for letting them out for the purposes of irrigation.

Tong-chou is a very considerable city, surrounded on all sides, except that facing the river, by a high wall and ditch, the usual defences of Chinese cities. At this place, the river being no farther navigable, the embassy was landed in order to proceed to Pekin, distant about 12 miles, a fine broad and paved road leading to the capital. It may here be observed, that although there was sufficient water in August to allow the large junks to proceed so far, upon the return of the embassy early in October the river was found to have fallen so much as to be barely passable for boats for some way below Tong-chou; and in the winter it was said to be frozen, and the navigation for a time suspended in consequence.

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2. *Notes on the Zambesi, from Quillimane to Tete.* From the Portuguese, by J. LYONS M'LEOD, Her Majesty's Consul for Mozambique.

AFTER leaving Quillimane, on the left hand ascending the river, we arrive at Inhasuja, which is about 2 leagues from Quillimane. Here a stream runs to the sea. On the same side of the river we next come to Interro, about 3½ leagues farther, where there is another stream running to the sea. From this place about 4 leagues is Maenboosha; about 4 leagues more, Mangara, where there is another stream running to the sea; 3 leagues farther is Chataunga; 4 leagues onwards Mejerumba; and 6 leagues farther is Mazaro, at the Boca do Rio. A long musket-shot from Mazaro, on the same side of the river, but looking down the Luavo, is Maruro.

The tide reaches Mangara, which is about 12 or 13 leagues from Quillimane. It takes three days going from Quillimane to Mangara by water, by land one day.

Boca do Rio is dry when the Zambesi is low, but there is always plenty of water in passing Mazaro to the sea by way of Luavo.

Above Boca do Rio, on the left hand ascending the river, immediately opposite Mazaro, is Chupanga, where the Zambesi is, both during the wet and also the dry season, at least 2 miles wide.

On the right hand going up (the left bank of the river) from Boca do Rio to the Rio Chire, the land is called Magangha. The Rio Chire in the rainy season has as large a volume of water as the Zambesi; and at the Boca do Chire the Zambesi rises very high in the rainy season, and this causes the water at Mazaro to flow down to Quillimane. Even in the dry season the Rio Chire is navigable, but the stream is not so rapid as in the Zambesi. The natives ascend it in large canoes, making voyages of from twelve to twenty days to trade with a people called Magangheros. This river flows past the western flank of the Maromballa mountains (that is to say, these mountains are to the east of it), which are very high. In ascending the Zambesi, this ridge is seen first from Mangara, and it is in sight until after passing Senna.

The land on the left hand, opposite Magangha, is called Bororo: it is mountainous.

Before coming to Boca do Chire one meets with many small islands which have no names, and some of which disappear during a very wet season; but close to the Boca do Chire, and just below it, are two considerable islands, the first of which is called Ilha Muinha; the second, which is larger, is called Ilha Mozambique, and has about 300 natives living on it. Ilha Muinha (in Kaffir) means "Salt Island;" and on this island, at Caia and at Sone (close to Senna), the salt used in the river is made. Along both banks of the Zambesi the salt is made thus:—A portion of earth (taken up anywhere) is placed in an earthen vessel with a crack in the bottom of it; this is placed over another vessel, water is poured into the upper vessel, and the earth is moved about; the water that comes through the upper into the lower one is boiled or allowed to evaporate in the sun; the residuum is very fine salt, proving that the valley of the Zambesi was formerly the bed of the ocean.

The country in the interior opposite the mouth of the Rio Chire is called Chiringoma, from which to Sofalla is eight days' journey, and by land to Senna twelve days' journey.

After passing the Boca do Chire, and on the opposite side of the Zambesi, is Caia, where the best fish in the river abound: the fish are salted and dried in the sun; some quantity are also smoked, but the former are preferred in the native markets. From Caia to Senna is two days' walking (about 10 leagues), by water about 3½ days (16 leagues).

After passing Caia you immediately come to Inhamudendundo, meaning, in the Maravi language, "large country." It runs along the river about 5 leagues, when one arrives at Inhamatuze, which, in the Senna language, means "dirty island," as in the rainy season it is entirely surrounded by water, and before it was brought under cultivation it was the resort of numerous animals who made their lairs there: it is one league from Senna.

Above the Boca do Chire, on the same side of the river, and nearly opposite to Inhamudendundo, is Santa Beze, in the rear of which, and all the way from the Boca do Chire, is a range of low, rocky mountains, dividing the streams of the Zambesi and Chire, the latter river running between this range and the Maromballa Mountains.

Between Senna and Tete there are numerous islands and banks, and even some rocks, and a few eddies; but when the river is in flood there is no difficulty in the way of steam navigation. In the dry season the navigation for a steamer would be doubtful. The banks of the river are well wooded with large timber. Fuel is easily procurable in great quantities.

The Zambesi, even in the dry season, is navigable from the Luavo mouth

to Cavravassa for a vessel drawing four feet; and in the rainy season the river has at least in the shallowest part more than 12 feet, and during that season the water rises about *sixty* feet in the narrows of Lupata. As I have already stated, the tide reaches Mangara. The current is from 2 to 6 miles per hour, according to the season. The river is about 3000 yards wide at Tete; at Senna, 1½ miles; at Quillimane, about 800 yards; at Quillimane Bar, more than 2 miles.

There are no fords. In some dry seasons there are rapids between Senna and Tete; they are not dangerous, and always passable. The bed of the river is mud, gravel, and sand.

In the dry season the water of the river is clear and transparent; in the rainy season it is brown, and at times approaching to a bright yellow. At this season the Mozambique Channel is discoloured at a distance of 80 or 100 miles from the Quillimane Bar. At Cavravassa there is a high fall; here vessels discharge their cargoes, which are carried a quarter of a mile overland and reshipped; this operation is repeated twice before reaching Zumbo.

In the neighbourhood of Tete, gold, coal, and iron are found in close proximity. More definite information on this point, with a plan of that portion of the country, and particulars of labour, carriage, &c., I am promised by Major Sicard, Governor of Tete.

Large quantities of wheat are grown at Tete and in the surrounding country, which is considered the granary of the Zambesi: both Senna and Quillimane are annually supplied from thence. At Tete the price of wheat is about half a dollar per arroba of 32 lbs.

Opposite to Tete the country is almost overrun by the sugar-cane. The natives make sugar, but it is of an inferior quality, owing to their not understanding the manufacture of it.

The people of Tete have a great advantage over other parts of the river, for in the rear of the town, and at the foot of it, only a mile distant, is the Caruera, a high mountain, said to be from 3000 to 5000 feet in height. Here they have their plantations, consisting of different varieties of Indian or Kaffir corn, peas, beans, sweet potatoes, cabbages, onions, &c.; and close to the village is a place called Ilhalutanda, having an area of from 10 to 20 square miles, which in the rainy season is more or less flooded. When the waters retire, they plant rice, corn, wheat, beans, &c.; so that, should the plantations in the high lands fail for want of rain, they have a crop below; and, if the floods destroy the crop below, they have a supply in the mountains. In the rainy season there is generally a great fall of rain, accompanied by very high winds from the south and south-west. At times, when it is very hot, after continued calms, they have violent whirlwinds, which destroy everything in their course, breaking trees and taking up houses and whirling them in the air as if they were straw mats. Some years, in the months of June and July, they have a hot wind from the south-west, which burns up everything that may be in the ground; but this is unusual.

From Inhasuja (which is close to Quillimane) to Mazaro, and even in different parts of the river as high as Senna, the natives build their huts on stakes about 20 feet above the ground, so that in the rainy season they will not be endangered by the floods, which are constant and sudden. During this time it is not unusual for a native to indulge in the luxury of fishing out of his bed. In 1855 thousands of the natives were drowned by the river rising higher than usual; many who escaped the flood fell victims to the famine that succeeded it.

Fish of different species abound in the Zambesi. Buqueña; a long fish, long head, no scales, white, from 1 to 6 feet in length, weighing about 8 lbs., very oily, and without any small bones. Pende; from 6 to 20 inches in length, broad, scales, black, from 1 to 4 lbs. in weight; no small bones.

Muja; from 1 to 6 feet in length, from 1 to 10 lbs. in weight, long, scales, round head, sides silver, back black. Caçao; shark, called in the salt water Tubarão: similarly certain fish of this family ascend the Senegal, Amazon, and other great rivers, to the distance of several hundred miles from the ocean (vide Lyell's *Manual of Elementary Geology*, 5th edition, p. 126, and *Proceedings Geol. Soc.*, No. 43, p. 222). There are many other fish, and none poisonous.

The principal feeders or tributaries of the Zambesi are,—the Chire, between Mazaro and Senna; the Zangué, just below Senna (it is small); the Aruenha, between Massangane and Marangue; the Revubue, nearly opposite to Tete.

There are many lakes close to the river, and some of them communicate with it even in the dry season: among them may be named,—one at Caia; another in Maganja, near Santa Beze; another near Chiramba; and one in Benga, nearly opposite to Tete.

It is stated that there are no volcanoes, nor the appearance of extinct craters; and earthquakes are unheard of.

In the Caruera behind Tete there is one ferruginous spring.

For the foregoing information I am obliged to Major Tito Augusto d'Aranjo Sicard, Governor of Tete, and also to George Wilson, private in the Mozambique Company of Invalids.

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3. *Explanations of the Physical Map of the Island of Madeira.* Dedicated to the Royal Geographical Society by J. M. ZIEGLER, Corres. Member.

THE impression made by the appearance of this interesting island on a traveller from the north, and especially an inhabitant of the Alps, is very striking, independently of the beautiful vegetation which covers the slopes of its mountains. There are seen deep chasms, precipices almost perpendicular, and rounded summits beside lofty needle-shaped peaks. In journeying through the island acclivities are passed which are ascended by hollows in their sides. Everywhere are encountered traces of volcanic action which, having become extinct, no longer present to the beholder columns of smoke or eruptions of cinders. But the interest of the admirer of the picturesque is not thoroughly satisfied—he sees only outlines more or less subdued. The crests and sharp peaks of the Alps are wanting, as well as the vastness of the masses composing our mountains, though the contrasts of great heights and great adjacent depths may be more remarkable. The rough-grained formation of the Vinoso (*pedra molle*, or *cantaria molle*, the building stone of the inhabitants, which they work marvellously), and the trachytic tufa resting upon it,* give not only to the rocks, but to the general appearance of the island itself, an aspect rather romantic and varied than wild and grand. Nevertheless there is probably no spot on the earth which exhibits more clearly the differences between the north and south declivities of mountains and the influence of elevation as affecting vegetation and temperature, and which would be more adapted for facilitating meteorological observations, and merits multiplied stations for such researches, and botanic gardens.

The map to which these explanations refer, in displaying the plan of the

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* The most ample details will be found in the following works:—O. Heer, Die fossilen Pflanzen de S. Jorge (1856); by the same Author, Naturcharacter und geologisches Alter von Madeira (1852); Capt. Vidal, R.N., On the Geography of Madeira; and lastly, an important work to be published by Sir Charles Lyell and G. Hartung on the Geology of Madeira.

island, ought at the same time to indicate the geographical distribution of its most abundant and characteristic plants. Along the shore the culture of the vine is general, and to the greater extent in the southern part of the island. It prevails especially in the gorges of the narrow valleys, as, for example, adjacent to Camara de Lobos, in the Caldeira, and Estreito; and near Funchal, in the valley of Santa Lucia, on the declivity of St. Roque. Under the branches of the vines, which are trained over trellis-work of reeds, legumes are raised in great quantities, and even the sugar-cane, followed closely by the coffee-plant and the yam (*Arum peregrinum; Arum colocasia*), which requires humidity for its growth, as well as heat. Rye and wheat are cultivated above the chesnut woods to a height of even 2500 feet on the north coast, where the inhabitants have farmed in the *Mato* region extensive lands for some years past. The vine succeeds perfectly on the southern coast in positions open to south and east winds, even at an elevation of nearly 1500 feet. On the northern side of the island it thrives in the valleys, and especially in places sheltered from the west wind, interlacing its branches with those of the chesnut-trees. In the eastern part of the island the vine is cultivated to a considerable extent, but on the western side vineyards are exceptionally met with only in two localities, near Porto do Pargo and Porto Moniz. It must be remarked that these two places have suffered least from the grape-disease, which for four years has caused much calamity to all the inhabitants of Madeira. Above the vine, the chesnut forests (*Castanea vesca*) extend on the southern declivities, between the altitudes of 1000 and 2000 feet above the sea: at Jardin da Serra and Curral they reach 2500 feet of elevation. On the north coast the chesnut constantly follows the vine; it avoids there the wind which it easily supports on the south side of the island. The laurel everywhere avoids strong currents of air. The fine and often very large trees of this order comprise the following species: *Laurus-canariensis;* the til of the Portuguese, *Oreodaphne fœtens;* and the *Persea Indica*, or vinhatico of the natives. It is only in the north of the island that virgin forests of these trees are found; in the south they are concealed in narrow crevices, and are scarcely ever met with in considerable clusters, except at Curral in the Serra d' Agoa, and on the Serra di Fora. The pine (*Pinus pinaster*) is of a different nature. It seeks localities exposed to currents of air; it is not found in the ravines; and it does not thrive in the northern parts of the island, where sea-breezes are not effectually experienced. It conforms in its character with our pines in preferring sandy situations and a dry soil. Above the region of the laurel extends that of the *Mato*, especially on the northern declivities, covered everywhere with shrubs equal in height to trees, and in some places collected in impenetrable thickets. The plants contained in this region are the *Erica arborea, Vaccinium Maderense, genista,* and *ulex*. There is but one place at which this region is interspersed with a group of laurels. The Chão do Caramujo (plain of snails), elevated above the south extremity of the valley of St. Vincent, is surrounded by a thick bush of genista and erica. The plants of this region, the lower ones being represented chiefly by the uveira of the natives (*Vaccinium*), in common with the laurels, do not well bear the westerly winds. They grow indeed on the upper slopes under the influence of these winds; but they diminish in height, and are farther separated from each other in proportion as they are exposed to the inclemency of the atmosphere. This is readily seen at Paul da Serra and at Poizo, a short distance below that crest (col), toward the north. On arriving at Feiteiras the luxuriance of the genistas and ericas is suddenly manifested, and it increases until we arrive in the laurel forest of Rio Frio. The same thing is met with on the banks of the São Vicente, at Calheta. Having left the groups of chesnut-trees, we cross some rye-fields, and arrive at the *Mato*, which is introduced by the beautiful airelle (*Vaccinium*), surpassing in height a horse and

his rider, immediately followed by the broom (*Genista*) and heath (*Erica*). These shrubs, however, become more rare and stunted on the plateau of Paul da Serra. On the descent towards Calheta they further diminish, the heath becoming the representative plant of that region. As to locality and soil, these three species of plants correspond remarkably in their preferences, or otherwise, with those of our latitudes. The smallest, the airelle (*Racinium myrtillus*), seeks the humid shade of the pine forests (*Pinus picea*); the heaths delight in the vicinity of the firs (*Pinus sylvestris*); whilst the brooms (*Genista tinctoria* and *pilosa*) prefer situations open to the sun.*

In order to complete the physiognomy of the island, which the map is intended to reveal, some meteorological indications must be noticed, resulting from its configuration. There are but two stations, with observations at which we are acquainted: those made at Funchal and in its vicinity we learn from the English works of Mason, Clark, White, and Harcourt; a German work lately published † informs us of the results of those made at St. Anne. The hygrometric observations confirm what has been stated concerning the vegetation on the different slopes—that those on the north are more humid than those on the southern side. Hence it is that the levadas or conduits of water are necessary to render irrigation and extended cultivation practicable on the southern side of the island. The dominant winds, the north and north-west,‡ bring damp. Their predominance, however, does not enfeeble the influence of the west winds on the vegetation. The valleys of São Vicente and Bôa Ventura are completely open to currents of air from the north, notwithstanding their declivities exposed to the west wind are clothed with a more stunted vegetation, especially in their upper portions, than are the opposite slopes. In the same account, the most extensive laurel woods, and containing the largest trees, are seen in the valley of Medada, which is closed on the west side. The cultivated lands at greater elevations are liable to the same conditions.§ Even in the Bay of Funchal, where west and north winds are very rarely experienced, the banana (*Musa paradisiaca*) is seen in perfection only where it is completely sheltered from them. The same is the case as respects the few date-trees (*Phœnix dactylifera*) on the south and east coasts. The localities suitable to their growth are protected against the west wind; examples in proof of this are seen at Calheta, Ponta do Sol, Camara de Lobos, Funchal, and Machico, which places, however, are subject to sea-breezes. The pine (*Pinus pinaster*) bears every current of air; and there is every probability that the upper boundary of its forests marks the limits of its sea-breezes in the interior of the island.

The abrupt rise of the coast in some places from the border of the sea causes

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* Observations on plants which have been introduced, and on the flora of Madeira, will be found in the work of O. Heer, 'Die periodischen Erscheinungen der Pflanzenwelt in Madeira' (1853).

† Dr. C. Mittermaier, Madeira und seine Bedeutung als Heilungsort (1855).

‡ According to Mittermaier, in 1000 observations—

The N. wind was found to prevail	256	times—the	W.	77	times.
N.N.W.	68	„	N.W.	170	„
N.W.	88	„	N.N.W.	166	„
S.	8	„	W.	4	„

§ A position analogous to that of Madeira is occupied by the rock of Tristan d'Acunha. According to the communications of Captain Denham, R.N. (Nautical Magazine, 1853, pp. 183, 188), we may conclude that notwithstanding the variable climate there, the S. and S.W. winds bring humidity, as is the case at Madeira with N. and N.W. winds. The conditions of the S. and N. coasts are reversed in the two islands. It would be interesting to know how far the contrast holds good with respect to the vegetation of Tristan d'Acunha.

an ascending current which in those parts rises nearer to the coast-line than to the massive and terraced heights of the centre; the breezes are thus hindered from penetrating into the interior, and it doubtless thence happens that the pine-woods approach the sea more nearly in the south-east part of the island, whilst in the south-west they are withdrawn into more central positions. On the two sides of Fajãa d'Ovelha, which rise almost perpendicularly from the sea-shore, the groups of pines are favoured by winds coming in a direction given to them by the ascending currents from the neighbouring ribeiras; whilst above Prazeres and Arco da Calheta these trees are mostly limited to the crests of the heights, the smooth slopes of which cause the ascending current to be driven farther into the interior. The south coast is especially suitable for observations on the regular changes of the land and sea-breezes. The northern coast affords less facilities for them on account of its humidity and dense vegetation. Thermometric observations made in the neighbourhood of Funchal (at Caminho de Torrinha, 284 feet above the sea) have proved that the temperature of the air is generally at its maximum towards noon; the latter may, however, be attained before that time, on days when the morning has been cloudy. If in the forenoon the sun dispels the clouds, the maximum is reached more than an hour before noon, since the sea-breeze adds to its intensity.

The impression made by the first sight of Madeira on an inhabitant of the Alps has been mentioned. Some comparisons may therefore be made between the slopes of the valleys in the two regions. The sources (of the rivers) in Madeira cannot be regarded in the same point of view as those in the Alps, where the water gushes from the rocks, or issues from beneath glaciers. In those mountains are seen furrows of rapid descent which conduct the condensed moisture into a common bed. Nevertheless the ribeiras of Madeira, to a certain extent, bear a similarity to the upper courses of the rivers of the Alps. On account of the considerable elevation of the central mass of the island (the mean height of Madeira being, however, not more than about 2660 English feet above the sea), the loftiest summits are found almost immediately overlooking the deepest valleys, which, seen from commanding eminences, appear to have their floors almost horizontal. This is why it is sometimes heard said at Funchal, that "the Ribeira dos Soccorides flows *upwards* from Curral to the sea, as is proved by the view of it from the summit of the Pico dos Bodes!" However, even an experienced eye may be deceived as to the actual proportions of descent of the ribeiras. The following table gives the absolute and relative fall of the four principal rivers of the island, taking as the commencing point of each the place of junction of mere brooks, the heights of which are indicated in the Map:—

The R. dos Soccorides	has an actual descent of	2086 ft.,	or	348 ft.	per Eng. m.
„ Brava	„	2170 „		460	„
„ Janella	„	3200 „		533	„
„ do Porco	„	1200 „		600	„

These are descents which are never met with in the Alps, unless exceptionally.

The figures set down above, and the directions of the ribeiras, prove that the waters have found no great resistance to their flow from the volcanic formations, and that they pursue very nearly the shortest courses. If it be asked why it is not so in the Alps, it will be worth while to consider the nature of the declivities which make the greatest resistance, such as the rocks of the Alps oppose to the flow of the waters. The formations which oblige rivers to make the greatest windings are those of chalk (*Terrain crétacé*), and the *upper beds of the Jura formation*. Examples in proof of this are seen—

in Europe, in the Jura, as afforded by the river Doubs; in France, by the Saône and Loire; in the Alps of Trent and Belluno, by the Adige, Piave, and Tagliamento; in the Julian Alps, by the Isonzo, Sau, and Kulpa; in Dalmatia, by the Unna, Verbitza, and Narenta; in the Apennines, by the Tiber, Velino, and Pescara; in the north of Bohemia, by the Elbe; in North America, by the Missouri and Rio Grande; in India, in the Salt Range, by the Indus; east of the Aravalli mountains (Rajpootana), by the Bairass and Chumbul; in the Nizam's dominion, by the Wurda and Godavery, &c. A band, or circumvallation of the (calcareous) formations denoted, extends on the north and west of the Alps from Wiener-Neustadt to Nice. The primary direction of the principal rivers of the southern and central Alps is remarkable in so far as the upper courses of the Enns, Salza, Inn, Rhine, Reuss, and Aar, extend nearly parallel to the southern crest of this circumvallation—that is, from south-west to north-east. All these rivers suffer an inflection towards the north, in entering this bend, to pursue a new deviation on emerging from it, so that the water-courses of the Southern Alps have a north-east, and those of the Central Alps a north-west, direction. The analogy is borne out in the western part of the Alpine region by the rivers Arve, Rhone, Isère, and Durance. The mean fall of the chief Alpine rivers may be taken as follows:—

In the Southern Alps.

Upper course of the Enns,	14 ft.	per Eng. m.—across the calcareous band,	27 ft.
„ Salza,	32	„	„	33 ft.
„ Inn,	42	„	„	11 ft.

In the Central Alps.

„ Rhine,	108	„	„	15 ft.
„ Reuss,	280	„	„	0·5 ft.
„ Aar,	324	„	„	8 ft.

These figures show that the more rapidly inclined is the upper bed of a river the less is its descent when crossing cretaceous and the upper Jura formations. These rocks then offer a great resistance to the passage of water—a phenomenon not met with in Madeira.

In offering to the Royal Geographical Society of London the Physical Map of the Island of Madeira, with these Explanations, I must add the following remarks.

In drawing up the Map, I enlarged upon the scale of the marine chart of Capt. Vidal, R.N. (1843); and for the elevations I consulted what that officer has published on the Geography of Madeira, as well as the results of the observations of Sir Charles Lyell and Mr. G. Hartung. I owe many obligations to the constant kindness of Mr. Hartung, who has readily communicated to me from his well-stored portfolios that with which a residence of six winters in Madeira made him acquainted. I should not have ventured to publish the Map without the assistance of a friend like himself, who knows the island perhaps better than any other geographer. At the same time that I acknowledge the thanks due to Mr. Hartung, who has favoured me with his advice also during the engraving of the Map, I must also record those to another friend, who knew Madeira from repeated visits—I mean Dr. F. Mittermaier, the brother of the author of 'Madeira als Heilungsort.'

As to my own remarks, they have been nearly limited to considering the characteristic formation of the island, and the distribution of the plants most distinctive of its vegetation. During my travels I made some thermometrical observations, which, however, merit little consideration, since they did not

extend over the period of a few weeks. The following were noted in March, 1854:—

On March 10th, at

Santa Anna,	1000 ft. above the sea,	time 7½ A.M.,	cloudy.	Temp.	52° F.
Pico Ruivo,	6059 „	noon	„	„	46°·5
Santa Anna,	1000 „	8 P.M.	„	„	54°·5

On March 12th, at

São Vicente,	800 „	7 A.M.	quite clear.	„	52°
Paul da Serra,	5200 „	10 A.M.	fog. W. wind.	„	41°
Calheta,	1200 „	4 & 6 P.M.	cloudy.	„	60°

On the 21st, 22nd, and 23rd of the same month snow lay on the summits above the height of 3500 English feet.

The calamity caused by the grape disease may be conceived, knowing that in good years the produce of Madeira amounts to from 20,000 to 30,000 pipes of wine, and that the mean annual quantity of wine obtained in 1852 and 1853 was no more than 200 pipes in the whole island.

J. M. ZIEGLER.

Winterthur, Switzerland.

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4. *Essay on Chile.* By Don V. PEREZ ROSALES.

THIS book is written as an inducement to emigrants to settle in the western part of Chile, to which part only reference is made. The book is divided into two parts. The first part embraces the geographical position of Chile, its climate, hydrography, and productions.

The second part considers Chile in its political bearings, and then, in several chapters, gives an account of the different provinces of Chile, taken separately, concluding with a chapter containing a few general observations.

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5. *Notes to accompany the Plan of Queenstown, South Africa, sent to the Royal Geographical Society.* By Captain W. T. BAKER, F.R.G.S.

QUEENSTOWN lies in 31° 59″ S. lat., 27° long. E., at the southern base of the Bonkolo Range, and 95 miles N. of Grahamstown; the river Kowana, a tributary of the Great Lei, winds in a tortuous rocky bed immediately in front, whilst a vast basin of grass-land, varying from 3 to 10 miles in breadth, stretches away to the south. Behind, the mountains tower to the height of from 500 to 1500 feet above the vale; the great Hanglip, rearing its bluff crest at 6800 feet above the level of the sea, is a very conspicuous feature in the landscape about 8 miles due north of the place. The proximity of these mountain ranges subjects Queenstown occasionally to very rapid changes of temperature; in winter, *i.e.* in June and July, the tops are often covered with snow, which, however, rarely falls in the valley; the nights are sharp and piercingly cold, while the midday sun is as warm and genial as in the hottest day of an English summer. September and October bring frequent hurricanes from the north-west, which sweep down upon the plain with great violence, and have more than once levelled our tents to the ground. Yet, notwithstanding these sudden changes, the climate is remarkably healthy—a

circumstance to be attributed in a great measure to the clearness of the atmosphere as much as to the general dryness of its surface-soil.

The soil, for the most part a rich alluvial loam, is capable when properly irrigated of producing every variety of European vegetable, but neither garden nor agricultural pursuits are much indulged in by the colonial farmers, wool being the greatest and most profitable staple, and the boundless extent of good pasture land, with numerous saline plants, shows how peculiarly adapted the country is for sheep-breeding. The bases of the mountains are sprinkled with the prickly mimosa and evergreen shrubs, whilst the higher ridges and rugged tops are embellished with various species of succulent plants and flowering aloes, but there are no trees. Owing to the rapid decomposition of the sandstone formation, some of the undercliffs have assumed the most grotesque and singular outlines—embattled, as it were, with natural ramparts of perpendicular rocks, whilst they are garrisoned in many places with troops of large baboons.

The town itself, though barely three years in existence, is fast rising into a place of importance, being on the main line of traffic from Buffalo Mouth to Aliwal (North) and the Free State: there are 13 or 14 stores, and the business done is very great. The water of the Kowana has been carried out by means of an aqueduct from about three miles above the town, and from it smaller streams branch off to different parts; but very little in the ornamental way has been attempted, except planting a weeping willow here and there in the streets and along the watercourse. The camp is on an elevated plateau on the north side, and till within the last two months has been occupied by the headquarters of our regiment, eight companies strong; but now it is sadly diminished, 300 men being detached at Bramneck, Tylden, and Winfogleneck along the frontier line, and the headquarters, too, have moved to Grahamstown, leaving only half a company at Queenstown, so that the large camp exists *now* only upon paper, though there are some chances of its being again augmented. Sportsmen find plenty of work in the plains around: the herds of beautiful springbuck afford the most exciting chase, and for birds there are partridge (grey and red-winged), guinea-fowl, the Kaffir pheasant, quail, plover, and snipe in abundance; excepting a few hartebeests and ostriches, which are very wild on the Boutebuck Flats, the larger game has all been driven far inland by the advancing steps of the white man.

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6. *The Discovery of America by the Northmen.**

THE Dane Gardar, of Swedish origin, was the first Northman who discovered Iceland, in 863. Only a few out-places of this country had been visited previously, about 70 years before, by Irish hermits. Eleven years subsequently, or in 874, the Norwegian Ingolf began the colonization of the country, which was completed during a space of 60 years. The colonists, many of whom belonged to the most illustrious and most civilised families in the North, established in Iceland a flourishing republic. Here, on this distant isle-rock, the Old-Danish or Old-Northern language was preserved unchanged for centuries, and here in the Eddas were treasured those Folk-songs and Folk-myths, and in the Sagas those historical tales and legends, which the first settlers had

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* Communicated by Professor Charles C. Rafn, and founded on his work 'Antiquitates Americanæ sive Scriptores Septentrionales rerum Ante-Columbianarum in America,' published by the Royal Society of Northern Antiquaries of Copenhagen.

brought with them from their Scandinavian mother-lands. Iceland was therefore the cradle of an historical literature of immense value.

The situation of the island and the relationship of the colony to foreign countries in its earlier period, compelled its inhabitants to exercise and develope their hereditary maritime skill and thirst for new discoveries across the great ocean. As early as the year 877 Gunnbiorn saw for the first time the mountainous coast of Greenland. But this land was first visited by Erik the Red, in 983, who three years afterwards, in 986, by means of Icelandic emigrants, established the first colony on its south-western shore, where afterwards, in 1124, the bishop's see of Gardar was founded, which subsisted for upwards of 300 years. The head firths, or bays, were named after the chiefs of the expedition. Erik the Red settled in Eriks-firth, Einar, Rafn, and Ketil in the firths called after them, and Heriulf on Heriulfsnes. On a voyage from Iceland to Greenland this same year (986), Biarne, the son of the latter, was driven far out to sea towards the south-west, and for the first time beheld the coasts of the American lands, afterwards visited and named by his countrymen. In order to examine these countries more narrowly, Leif the Fortunate, son of Erik the Red, undertook a voyage of discovery thither in the year 1000. He landed on the shores described by Biarne, detailed the character of these lands more exactly, and gave them names according to their appearance: Helluland (Newfoundland) was so called from its flat stones, Markland (Nova Scotia) from its woods, and Vineland (New England) from its vines. Here he remained for some time, and constructed large houses, called after him Leifsbudir (Leif's Booths). A German named Tyrker, who accompanied Leif on this voyage, was the man who found the wild vines, which he recognised from having seen them in his own land, and Leif gave the country its name from this circumstance. Two years afterwards Leif's brother, Thorwald, repaired thither, and in 1003 caused an expedition to be undertaken to the south, along the shore, but he was killed in the summer of 1004 on a voyage northwards, in a skirmish with the natives.

The most distinguished, however, of all the first American discoverers is Thorfinn Karlsefne, an Icelander, whose genealogy is carried back in the Old-Northern annals to Danish, Swedish, Norwegian, Scottish, and Irish ancestors, some of them of royal blood. In 1006 this chief, on a merchant-voyage, visited Greenland and there married Gudrid, the widow of Thorstein (son of Erik the Red), who had died the year before in an unsuccessful expedition to Vineland. Accompanied by his wife, who encouraged him to this voyage, and by a crew of 160 men on board three vessels, he repaired in the spring of 1007 to Vineland, where he remained for three years, and had many communications with the aborigines. Here his wife Gudrid bore him a son, Snorre, who became the founder of an illustrious family in Iceland, which gave that island several of its first bishops. His daughter's son was the celebrated Bishop Thorlak Runolfson, who published the first Christian code of Iceland. In 1121 Bishop Erik sailed to Vineland from Greenland, doubtless for the purpose of strengthening his countrymen in the Christian faith.

The notices given by the old Icelandic voyage-chroniclers respecting the climate, the soil, and the productions of this new country are very characteristic. Nay, we have even a statement of this kind as old as the eleventh century from a writer, not a Northman, Adam of Bremen. He states, on the authority of Svein Estridson, the King of Denmark, a nephew of Canute the Great, that the country got its name from the vine growing wild there. It is a remarkable coincidence in this respect that its English re-discoverers, for the same reason, name the large island which is close off the coast Martha's Vineyard. Spontaneously growing, wheat (maize or Indian corn) was also found in this country.

The total result of the nautical, geographical, and astronomical evidences in

the original documents, place the situation of the countries discovered beyond all doubt. The number of days' sail between the several newly found lands, the striking description of the coasts, especially the white sandbanks of Nova Scotia and the long beaches and downs of a peculiar appearance on Cape Cod (the Kialarnes and Furdustrandir of the Northmen) are not to be mistaken. In addition hereto we have the astronomical remark that the shortest day in Vineland was 9 hours long, which fixes the latitude of 41° 24′ 10″, or just that of the promontories which limit the entrances to Mount Hope Bay, where Leif's booths were built, and in the district around which the old Northmen had their head establishment, which was named by them Hóp.

The Northmen were also acquainted with American land still farther to the south, called by them Hvítramannaland (the land of the White Men) or Irland it Mikla (Great Ireland). The exact situation of this country is not stated; it was probably North and South Carolina, Georgia, and Florida. In 1266 some priests at Gardar in Greenland set on foot a voyage of discovery to the Arctic regions of America. An astronomical observation proves that this took place through Lancaster Sound and Barrow Strait to the latitude of Wellington Channel. The last memorandum supplied by the old Icelandic records is a voyage from Greenland to Markland in 1347.

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7. *Ascent of the Congo*—1857. By Commander J. HUNT.*

I DETERMINED on obtaining some information of that part of the river hitherto unexplored, as we found, from Punta de Luisa upwards, the chart was no guide to us whatever. About 2 P.M. on the 1st instant I proceeded up the river, keeping the left bank. We found the river, instead of being straight, as shown in the chart, is a succession of serpentine turns, each point of the turn causing a small rapid, at some of which there was apparently a fall of from 1 to 3 feet. We had great difficulty in shooting the boats through these rushes; on one or two occasions were obliged to use hauling lines to assist us. On these occasions I was kindly assisted by Commander Moresby, of the *Sappho*, who accompanied us. On the nights we anchored. We always found convenient anchorage in little bays formed by rocks, and overhung by trees of a hardy evergreen species, differing from those at the mouths of African rivers. On the 4th instant, at 8 A.M., we reached the commencement of the falls, having had extreme difficulty in getting over the last rapids about 2 or 3 miles below them. From what we could observe, the Falls of Gallala below the great fall, which we believed could be but a very short distance from the place we reached, are a succession of small falls. The river here we found, by experiment with a rifle, was about 200 yards wide, barriered on each side by steep rocks and boulders of rocks, rising almost perpendicularly in some places from 600 to 800 feet. The fall we reached was something between a fall and a rapid, the descent being from about 8 to 10 feet, the water shooting out from the angle of the rocks on each side of the river, forming the letter V, the lower part being down the river, the reaction at the sides making a terrific surf, which made it impossible to see whether there were rocks in the middle or not. Owing to these difficulties in the river, and the rocky nature of the land around that part of it, and provisions being short, at 11 A.M. we commenced our return, and reached Embourina on the same evening, the current running with us from 6 to 9 miles an hour. I returned

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* Extract from a letter addressed to Commander V. G. Hickley, of the *Childers*, by Commander J. Hunt, of the *Alecto*, dated 15th January, 1857.

to my ship at Shark Point on the 6th instant, not having had a single case of sickness during the whole expedition.

With this Report I enclose some rough outlines of the principal points and headlands of the river. I consider the distance from Punta de Lucha to Embourina, following the turns of the north side of the river, to be about 60 miles, and from Embourina to the first commencement of the falls about 70 miles. I consider that above Embourina the navigation would be dangerous for sailing vessels, but of easy access to small steamers, such as our gun-boats; and I believe that the river could be ascended above the falls by canoes, occasionally carrying them across the points where the rapids are strong.

The scenery and appearance of cultivated ground, in some parts of the soil is of a bright red and dark brown colour, and near the river dark green rocks of a very heavy substance, which I fancy contains both iron and copper. The ravines between the hills are well wooded, and are marked with watercourses which by their appearance must have had at times large bodies of water washing down them. We observed species of the arbutus, and many other trees now common in English gardens. The rocks and cliffs near the water were festooned in many places with magnificent flowering creepers, among which I noticed the Passion flower, and yellow, white, and pink jasmines. Several different sorts of deer and monkeys were seen, also a species of gnu in the river. I saw at various times hippopotami and large alligators, and a species of otter, also a great variety of wild fowl.

The weather was so pleasantly cool, that on one or two occasions we dispensed with awnings in the daytime. We saw but few natives about Embourina, and they appeared a poor, harmless set, chiefly employed in fishing.

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8. *Coast of Morocco.* By W. J. ELTON, Vice-Consul at Mogador.

Communicated by Captain J. WASHINGTON, R.N., &c.

AT about an hour and a half's journey south of Agadeer is the mouth of the river Soos. This river rises at a place called El Kabla, about three days' journey eastward of the sea. At rather less than half a day's journey south of the mouth of the Soos is the mouth of the river Massa, which rises in a mountain about a day's journey in the interior from Agadeer. At the mouth of the Soos, and at that of the Massa, there is at high water about 1½ feet, and at low water about 2 feet of water. At the mouth of the Soos there is no surf, but at the mouth of the Massa there is much. From the mouth of the Massa to a little town called Seed Bom Noire, where there is a small harbour, is about half a day's journey; from Bom Noire to a town called Bulfidial it is three hours' journey—the town cannot be seen from the sea; from Bulfidial to a place called Grishime about three hours' journey. At Grishime there is a village which can be seen from the sea. From Grishime to Meryleft it is also about three hours' journey. At Meryleft there is a saint house, which can be seen from the sea; there are also the ruins of a battery. At about half an hour's journey south of Meryleft are a town and gardens. Meryleft is said to have been a port about 200 years ago. There is an island near the coast which at low water can be reached by wading. Some of the inhabitants of Meryleft have arms, which it is said were imported there from a place called Erykoont, which is about three days' journey from Meryleft. From Erykoont to Legyera (where there is no town) it is two hours' journey. At Iffney there is a saint-house, and more than 100 houses, all of which can be seen from the sea. At all the places named, and the coast between

them, except at Bom Noire (where there is a beach), the coast is rocky, and there is generally a heavy surf breaking. At all the places named from Bom Noire to Iffney there are many boats. About twenty-five years ago a vessel, supposed to be Spanish, was with great difficulty loaded at Bom Noire with wheat and beeswax. The vessel lay off Bom Noire several days before she was communicated with: at last a boat went to her, when one of the crew of the vessel went on shore and made presents to the chief, Ali Oh Hassan, of guns, swords, &c. After that, boats went off to her with cargo, but the master would not allow more than one boat at a time alongside, the cargo of which he paid for. The Moors are said to have had the intention of taking possession of the vessel; but a Moor in one of the boats which went off with cargo informed the master of the vessel of what the Moors intended, and he immediately got his vessel under weigh, although the cargo had not been completed. From Iffney to the mouth of the river Assaka it is about half a day's journey. At the mouth of the Assaka there is plenty of water, and the rise and fall are very little. About a day's journey eastward of the river Assaka is the town of Wadnoon, which is the commencement of the Sahara, or Desert. From the mouth of the river Assaka to the mouth of the river Drah, which rises at a place called Ohivarran, an hour and a half's journey in the interior above Wadnoon, it is a day and a half's journey. The Drah at its mouth, and for an hour and a half's journey up, cannot be forded at high water; at low water there is not more than two feet of water: generally there is not much surf at the mouth. A short time ago the chief at Wadnoon, Sheik Beiruk, intended to have established a port at a place called El Bouida, in the province of Ezergien. El Bouida is a bay about three hours' journey north of the mouth of the Drah. At El Bouida there are houses, which can be seen from the sea. The population in the district, said to be under Sheik Beiruk's rule, is very large; but of this population there are only about 8000 armed men, who are actually under his control: of these 8000 about 2000 are horsemen. The property of the people at Wadnoon consists chiefly of horses and sheep, each inhabitant possessing about 20 camels and 100 sheep; the wealthier inhabitants as many as 300 camels and 2000 sheep each. Sheik Beiruk is said to be very wealthy, and trades much.

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9. *Memoranda of a Visit to the Site of the Ruins of the ancient City of Sizicus in Asiatic Turkey.* By E. LEAHY, C.E. 1857.

Communicated by SIR RODERICK I. MURCHISON.

LEFT Constantinople for Panorma, in my steamship *Star* on Saturday morning, 23rd May, at 9 o'clock A.M. Panorma is about 70 miles S.W. by W. from the Seraglio Point, and is situated on the Asiatic shore of the Sea of Marmora. Population about 4000, one half being Christian and the other half Mahometan. The place is remarkable chiefly for its proximity to the site of the ancient city of Sizicus, and for some quarries of handsome red marble found in an insulated deposit of limestone at the southern suburbs of the town.

I was accompanied by Dr. and Mrs. Sarell, Mr. Philip Sarell, of the British Embassy, and the Greek Archbishop or "*Despot*" of Sizicus, and after a pleasant run of about nine hours we anchored opposite the town of Panorma at 6 o'clock P.M.

Next day the whole population of the town turned out to welcome the "Despot" (the general name in the East for bishop), who had not seen his

flock for the last three years, being too much occupied with "important business" in Constantinople.

The Archbishop's influence procured us the best horses and saddles in the town, and, accompanied by him, we all started at 10 o'clock A.M. for the ruins of Sizicus, where we arrived in about an hour, the distance being only 5 miles. These ruins are situated on the N.E. end of the isthmus separating the peninsula of Artaki from the mainland.

Comparatively few traces of Sizicus now exist above ground; even the name would in all probability have long since been unknown in the country but for the creation of an archbishopric of the same name.

The most remarkable ruins are an aqueduct and some sarcophagi; the latter are, indeed, in such good preservation that they cannot well be called ruins. Close on the sea-shore are two of these tombs; they were lately uncovered, being only 3 to 4 feet below the surface, and are in fine preservation. The covering-lid of each sarcophagus is hewn out of one block of white marble, of which there are extensive beds in the adjacent island of Marmora, and each of those blocks must have weighed upwards of 20 tons. The interior of each sarcophagus was divided into two stories by a thick flagged floor, inserted in and supported by the side-walls. In the lower story were found eight, and in the upper seven, human skeletons. In the general outline the figure of the Egyptian sarcophagus in the British Museum is alike to those of Sizicus. The recesses of the architraves of the latter do not appear to have been quite finished, but the workmanship of the mouldings is excellent. One sarcophagus is ornamented with an "egg and dart" moulding, running quite around in full relief, and wrought as finely as anything of the sort, ancient or modern, within my knowledge.

The whole breadth of the Isthmus of Sizicus is covered with broken columns and massive walls faced with square blocks of black granite, and backed with rubble masonry set in lime cement. The walls are distinctly traceable across the isthmus, from sea to sea, at the junction of the peninsula of Artaki; and appear to have served as the line of fortifications for Sizicus facing the continent. The city extended from those walls into the peninsula of Artaki, and at a distance of about a mile there still remain the ruins of a large aqueduct, in many parts over 100 feet high.

Strabo represented the peninsula as an island, and there is a tradition amongst the present inhabitants that the sea formerly ran across the isthmus, and that ships passed and repassed; but, if ever such a communication existed, there is no trace of it to be found at present.

The chart of this coast (Sea of Marmora), published and compiled in 1830-31 by our Admiralty, from surveys purporting to have been made by French, Spanish, and English, is not as accurate as could be wished. This chart shows a considerable inlet or canal cutting the isthmus almost across, whilst in fact there is no inlet whatever. The isthmus maintains a regular breadth of about a mile, without any indent or projection from sea or land. There is a sort of marsh in the middle which becomes a lake in wet weather.

Another and more serious error of the chart is the rock which is represented *above water* 1 mile S.S.E. of Mola island, at the entrance of the Bay of Panorma, and in the direct course from Constantinople to Panorma. There is no rock *visible* in that situation; but exactly in the same position there is a rock *having four feet water over it*, and is consequently very dangerous. Many vessels have been lost upon it, owing possibly to an over-confidence in the chart, and a consequent belief that *no dangerous* rock existed *under* water.

The Admiralty charts, prepared from the surveys of British officers, receive universal confidence for accuracy, and, in truth, they defy all criticism both for accuracy and clearness. An error of the sort just alluded to is the more dangerous because of this confidence, as foreigners unable to read English

rely upon the Admiralty's well-known stamp, and discover perhaps when too late that the surveys were duly noticed in the title of the chart as not being made by the Admiralty officers. This chart of the Sea of Marmora ought to be corrected and republished.

It is possible that the rock alluded to, which is now under water, might have sunk since the time the surveys were made, and it is also possible that the same cause which depressed the rock might have elevated the isthmus of Artaki. This supposition would be partly consistent with the representations both of the chart and of Strabo, but still not quite reconcilable with the comparatively recent date of the Admiralty chart.

At the same time, it may be well to remark that the earthquake of March, 1854, with which we in these localities were visited, caused many changes in the country between Artaki and Mount Olympus, so much so that the courses of some rivers near Brusa were entirely altered, and have remained so since.

EDMUND LEAHY.

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10. *Ascent of the Albert River in search of the Letters of Mr. A. Gregory, in command of the North Australian Expedition.* By Mr. JAMES FLOOD, Assistant Botanist.

November 13th, anchorage off the mouth of the Albert.—Daylight, heavy clouds to the S.W., wind strong from the E.; the bar in front of the river could be seen from the masthead, and was dry for a long distance. Deeming it unsafe to start with a small boat deeply laden while the wind was blowing so fresh and such a heavy cross sea on the bar, caused by the tide and wind, I had everything required for the journey got in readiness, with 10 days' rations, consisting of flour, pork, tea, and sugar, with a small keg of water. The wind and sea having somewhat abated, I left the vessel at 11·5 A.M., taking with me three men of the expedition, viz. Selby, Showell, M'Donald, and one of the crew. In crossing the bar the boat grounded, when we had to get out and draw her over the sand for about a mile. Entered the river (Kangaroo Point) at 12·45 P.M., when, passing the point, three natives came running down to the bank, calling out and beckoning for us to land. They all carried long spears, and in the hands of one was a large tomahawk. Proceeded up the river and reached the two first islands by 4·10 P.M. The wind now flew round to the south, which, against the tide, caused such a sea that with some little difficulty we kept the things in the boat dry. When we came abreast of the next two islands the wind increased from south, rising the dust and leaves in clouds, and we had to hold on to the mangroves to save our boat from taking in water. From Kangaroo Point to these islands the river banks are nearly one unbroken line of mangroves, behind which, in places, there appear to be extensive mangrove swamps. The islands consist of a mass of mangrove-trees, the tide at high-water flowing in among them. Entered the western branch of the river at 6·30 P.M., pushed on through the most tortuous reaches, having a fair tide, and hopes of getting fresh water, as the river was said by Captain Stokes to be fresh above Island Reach. We had now been some few hours without any, and one of the men was knocked up through drinking salt-water. At midnight passed through Island Reach, when, upon tasting the water, it was as salt as the sea. Mosquitoes now began to become troublesome.

Nov. 14th.—Passed through the large bend beyond Island Reach and by the remainder of the islands, when the mosquitoes became so thick and troublesome that we could pull no longer. At 3 A.M. we landed, lit a fire, rolled ourselves up in our blankets, and tried to get sleep for two hours, but

the mosquitoes kept themselves too fully occupied to allow of sleep, so we started again at daybreak. The river now begins to wear a different aspect, banks from 30 to 35 feet high show themselves with a few straggling gum-trees, but the mangroves in most places still line the river. We passed the 30 feet red sandstone cliffs, when another of the men was taken ill. At Alligator Point we encamped for a short time for a rest, but at 11·15 A.M. started again and pulled on against the tide. Passing up Hope Reach I had three men unable to work. The country bears a better appearance; undulating plains stretch away on each side of the river covered with gum-trees, having a very parched and arid appearance. Along the river sides are growing a species of melaleuca and casuarina; the river banks are much cut up by large ravines and gullies; these again are choked with trees and masses of earth. Camped at dusk near the tall palm-trees marked on the charts. I made a drink here that proved less disagreeable than pure salt-water, of which we all began to feel the effects: it was made by boiling flour, sugar, and salt-water together; mixed thin it was drinkable. Two of the men, during the heat of the day, had become quite delirious, but in the cool of the evening they were much better. Wind during the day from the south; 11·30 P.M. started with a fair tide.

Nov. 15th.—At 2·15 A.M. came to the wished-for junction of the river at the end of Hope Reach; one branch trending to the westward, the other running to the south. We pulled up the latter some distance, but could not find any fresh water, though there was certainly a slight improvement, it not being quite so salt. Camped until daylight, when we pulled up the river again, till it became choked with snags and fallen trees. A few tall palms, some pandanus, a small flagellaria cane, and a drooping melaleuca, were growing on the river banks, but even here mangroves are to be seen in small patches. Landed on the left bank of the river and came upon the tracks of Mr. Gregory's party. Proceeding up this branch of the river to the southward, with two men, I followed the tracks of the horses for some distance, until they crossed the river; here a number of trees had been barked; we still followed the river for some distance, until it became very narrow and nothing but a dry watercourse. So far there was no fresh water procurable. I went to the Plains of Promise, which bear as barren an aspect as any country I had seen in North Australia. The soil is a light sandy loam; the grass had been burnt off, so that a few crooked gum-trees were the most conspicuous of the flora. After taking a good view of the surrounding country, which gave no appearance of improvement in any direction, we returned to the boat and pulled down to the junction. Before starting, I planted 200 tamarind-seeds on the river bank. At the landing-place the depth of this arm of the river is from 14 to 15 feet. Fish appeared scarce; vampire-bats very numerous. The river banks are much cut in here by small and deep watercourses; I landed on the point, and found the marked tree of Mr. Gregory with directions where to find the letters, which I procured. The date of his arrival was on the 30th of August. Trees had also been cut here by the crew of the *Torch*, and the name of Lieut. Chimmo was cut in large letters on a gum-tree, dated August 3rd. Any letters that had been left by Lieut. Chimmo I concluded had been procured by Mr. Gregory. I left marks here by cutting my name upon a large gum-tree, with directions where to dig for a letter which I buried at the foot of the tree for Mr. Baines, as he had not yet arrived at the river. We pulled three miles up the western arm, and found the water very slightly brackish, so we camped for two hours and had a good pot of tea with a short sleep, which was very much needed. This arm of the river is full of dead snags; it is much larger than the southern branch. There must be a fine supply of fresh water from a good source to be running so strong at this (the driest) season; immense large forest trees lined the banks, having been

carried down by the floods. The river banks were covered in many places with green grass. The trees on the banks still retain their green foliage, and undoubtedly this is the finest part of the river. The camping places of natives were more numerous, and heaps of mussel-shells were strewed round their fires. The tide was now at ebb, so we filled every article that could be made to hold water and started down the river again, considerably refreshed. In passing I landed at the western and eastern angles; at the former there were no trees marked; at the latter Mr. Gregory had marked some trees, dated September 2nd, and had buried more letters, which I procured, and reached the tall palm-trees at 8 P.M., when meeting the flood-tide, we camped for the night.

Nov. 16th.—Started at 5 A.M. with the first of the tide, having had a restless night caused by the mosquitoes; passed the 30 feet cliffs, through Island Reach, and within four miles of the junction near the salt-water arm. At 5 P.M., the tide having turned, we encamped on a high, soft, mud-bank by the side of the river, the only spot within some miles that was free from mangroves. Although these banks are some feet above high water, yet the surface of them is quite soft, with a sticky kind of bluish clay covered with a coarse grass. After supper we rolled ourselves up in our blankets, and lay down for sleep, but no sooner did it become dusk than our old enemies, the mosquitoes, commenced in such good earnest, that we were forced to take to the boat. Every precaution, even a smoking fire, appearing useless, we pulled down to the junction and came to again, to wait for the turn of tide.

Nov. 17th.—We were all very glad when the tide turned, for the mosquitoes drove away all sleep. We started at 3·30 A.M. with a good flood-tide, passed all the Mangrove Islands, and seeing a good clear part of the bank on the left side, about seven miles from the entrance of the river, we landed and had breakfast. At this part of the river a small sandy alluvial plain descends, having a bank about 20 feet high. At the foot of this, at low water, the bed is seen covered with numbers of shells of many genera—arcas, cytheras, barnacles, &c. Trees were scattered here and there among them. We reached Kangaroo Point by 9 A.M., pushed out over the bar, and it being very low-water, we had to drag the boat about 1½ mile over the bar, but in two hours after leaving Kangaroo Point we reached the vessel, December 16th, 1857.

ERRATA.

At page 65, Equation 3, instead of a, read $a + b$, in both denominators.

At page 231, after "Estimate for 1858," *insert* "and Resolutions respecting Secretarial Duties."

At page 323, at the 17th line from the foot, instead of *Pangany*, *read Kingany*.

*** *All communications must be prepaid.*

LIST OF MAPS.

[In the Introductory Notice to 'Fullarton's Royal Illustrated Atlas,' the want of a Geographical Catalogue raisonnée of Maps and Charts was some years ago pointed out, and it was suggested that a Catalogue might be made in which should be inserted the title, scale, meridian, place and date of publication, number of sheets, dimensions, etc., of the principal Maps of the World. To a certain extent this has been carried out in the Map-rooms of the Royal Geographical Society by Mr. C. George, the Curator; and the following Tables of the principal Maps of European States, etc., are here given. Any additions to, or corrections of the list will be most thankfully received by the Editor.]

TABLE I.—ALPHABETICAL LIST OF THE PRINCIPAL MAPS OF EUROPEAN STATES AND THEIR COLONIES.

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TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES AND THEIR COLONIES.

(Arranged to Scale, May, 1858.)

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
1	1828	Turkey, &c. (Cotta)	1/1,000,000	1=0·063	1=0·073	6	Finished.
2	1854	Denmark (Bull)	1/933,333	1=0·069	1=0·078	1	Finished.
3	?	Iceland (Olsen)	1/960,000	1=0·066	1=0·076	1	Finished.
4	1857	France (Etat Major)	1/864,000	1=0·079	1=0·084	?	20
5	1822	Austrian Empire (Fallon)	1/864,000	1=0·073	1=0·090	9	Finished.
6	1801	Russia (Imperial Staff)..	1/800,000	1=0·079	1=0·094	113	Finished.
7	1848	Denmark (Bull)	1/800,000	1=0·079	1=0·094	1	Finished.
8	1822	Turkey in Europe (Lapie)	1/800,000	1=0·079	1=0·094	15	Finished.
9	1785	Norway (Enckson)	1/800,000	1=0·079	1=0·094	2	Finished.
10	1829	Germany (Stieler)	1/750,000	1=0·085	1=0·097	25	?
11	1823	Spain and Portugal (French Staff)	1/740,000	1=0·086	1=0·098	16	Finished.
12	1845	Norway (Munch)	1/700,000	1=0·089	1=0·103	1	Finished.
13	1854	Belgium, Railway Map (Havenne)	1/620,000	1=0·102	1=0·118	1	Finished.
14	1856	Austrian Empire (Scheda)	1/576,000	1=0·110	1=0·126	20	6
15	1829	Turkey	1/576,000	1=0·110	1=0·126	21	Finished.
16	1843	Italy (Civelli)	1/555,555	1=0·114	1=0·131	28	Finished.
17	?	Bavaria	1/500,000	1=0·126	1=0·146	1	Finished.
18	1853	Sardinia, Island of..	1/500,000	1=0·126	1=0·146	1	Finished.
19	1812	Russia (French Staff)	1/500,000	1=0·126	1=0·146	79	Finished.
20	1848	Morocco (Dépôt de la Guerre) ..	1/500,000	1=0·126	1=0·146	2	Finished.
21	1846	France (Vallot)	1/500,000	1=0·126	1=0·146	6	Finished.
22	1828	France (Dubrena)..	1/500,000	1=0·126	1=0·146	12	Finished.
23	1838	Germany (Woerl)..	1/500,000	1=0·126	1=0·146	28	?
24	1815	Sweden & Norway, South (Forsell)	1/500,000	1=0·126	1=0·146	8	Finished.
25	1817	France (Donnet)	1/388,800	1=0·163	1=0·189	20	Finished.
26	1845	Iceland (Olsen)	1/480,000	1=0·132	1=0·152	4	Finished.
27	1846	Denmark (Olsen)	1/480,000	1=0·132	1=0·152	2	Finished.
28	1806	Hungary (Lipszky)	1/469,472	1=0·135	1=0·155	12	Finished.
29	1847	Hungary (Schedius and Blashnek)	1/469,472	1=0·135	1=0·155	9	Finished.
30	1808	Naples, Kingdom of	1/444,444	1=0·143	1=0·164	6	?
31	1854	Austria, Transylvania	1/432,000	1=0·146	1=0·165	2	Finished.
32	1856	Russia (Schubert)	1/420,000	1=0·151	1=0·170	60	35
33	1839	Bavaria	1/400,000	1=0·158	1=0·182	5	Finished.

TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
34	1826	Greece (Lapie)	1/400,000	1=0·158	1=0·182	4	Finished.
35	1856	Algeria (Dépôt de la Guerre) ..	1/400,000	1=0·158	1=0·182	2	Finished.
36	1854	,, Constantine (Etat Major)	1/400,000	1=0·158	1=0·182	2	Finished.
37	1856	,, Oran (Etat Major)	1/400,000	1=0·158	1=0·182	2	Finished.
38	1857	Tunis	1/400,000	1=0·158	1=0·182	2	Finished.
39	1833	Tuscany (Segato)	1/400,000	1=0·158	1=0·182	?	?
40	1857	,, (Pozzi)	1/400,000	1=0·158	1=0·182	?	?
41	1840	Russia, Poland	1/384,000	1=0·163	1=0·189	8	Finished.
42	1851	Denmark, &c. (Bull)	1/384,000	1=0·165	1=0·196	4	Finished.
43	1856	Switzerland (Ziegler)	1/336,000	1=0·167	1=0·198	4	Finished.
44	1820	Jutland (General Staff)	1/370,000	1=0·171	1=0·200	1	Finished.
45	1838	Denmark (Gliemann)	1/360,000	1=0·172	1=0·201	4	Finished.
46	1824	Spain, N.W. (Capitaine)	1/345,600	1=0·183	1=0·211	13	Finished.
47	1816	France (Capitaine)	1/345,600	1=0·183	1=0·211	24	Finished.
48	?	France (Dépôt de la Guerre) ..	1/320,000	1=0·198	1=0·228	64	16
49	1848	Holstein, Lauenburg, Lübeck (Schumacher) ..	1/320,000	1=0·198	1=0·228	1	Finished.
50	1852	France (Etat Major)	1/320,000	1=0·198	1=0·228	39	19
51	1854	Holstein (Bidaut)	1/300,000	1=0·199	1=0·230	1	Finished.
52	?	Dutch Indies	1/290,000	1=0·218	1=0·250	50	20
53	1853	Austria, Servia, &c.	1/288,000	1=0·220	1=0·253	4	Finished.
54	?	,, Galicia	1/288,000	1=0·220	1=0·253	33	Finished.
55	1854	,, Hungary	1/288,000	1=0·220	1=0·253	?	32
56	1821	Spain and Portugal (Beauvoisin)	1/288,000	1=0·220	1=0·253	63	Finished.
57	1858	Wallachia (Von Fligely)	1/288,000	1=0·220	1=0·253	6	?
58	1853	Naples, Kingdom of (Marzolla) ..	1/280,000	1=0·227	1=0·248	15	?
59	1799	Italy (Bacher D'Abbé)	1/250,000	1=0·250	1=0·286	54	Finished.
60	1848	Egypt (Linant Bey)	1/240,000	1=0·253	1=0·290	4	Finished.
61	?	Switzerland (Dufour)	1/250,000	1=0·253	1=0·290	4	?
62	1841	Sardinia, Terra Firma	1/250,000	1=0·253	1=0·290	6	?
63	1857	Hesse, Duchy of, &c.	1/250,000	1=0·253	1=0·290	2	Finished.
64	1845	Sardinia, Island (Marmora)	1/250,000	1=0·253	1=0·290	2	Finished.
65	1857	Saxony (Hornig)	1/250,000	1=0·253	1=0·290	4	Finished.
66	1858	Denmark (Bath)	1/240,000	1=0·264	1=0·310	32	1

TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
67	1836	Slesvig (Olsen)	1/240,000	1 = 0·264	1 = 0·310	1	Finished.
68	1820	Denmark (Gliemann)	1/240,000	1 = 0·264	1 = 0·310	32	Finished.
69	1840	St. Petersburg, Govt. of (Schubert)	1/210,000	1 = 0·301	1 = 0·356	8	Finished.
70	?	Crimea (Betew)	1/210,000	1 = 0·301	1 = 0·356	8	?
71	1857	Baden	1/200,000	1 = 0·316	1 = 0·365	6	2
72	1852	Greece (Lapie)	1/200,000	1 = 0·316	1 = 0·365	20	Finished.
73	1832	Morea (Dépôt de la Guerre) ..	1/200,000	1 = 0·316	1 = 0·365	6	Finished.
74	1827	Norway (Gyessing and Ramm) ..	1/200,000	1 = 0·316	1 = 0·365	?	12
75	1848	Spain (Coello)	1/200,000	1 = 0·316	1 = 0·365	60	33
76	?	Sweden	1/200,000	1 = 0·316	1 = 0·365	?	?
77	1830	Tuscany (Inghirami)	1/200,000	1 = 0·316	1 = 0·365	?	Finished.
78	1848	Germany (Reymann)	1/200,000	1 = 0·316	1 = 0·365	359	Finished.
79	1855	Algeria, Grande Kabylie (Et. Major)	1/200,000	1 = 0·316	1 = 0·365	1	Finished.
80	1855	Russia, Crimea (Mukin)	1/195,528	1 = 0·330	1 = 0·379	3	?
81	1839	Russia, Livonia	1/187,500	1 = 0·340	1 = 0·390	6	Finished.
82	1848	Belgium	1/160,000	1 = 0·396	1 = 0·465	9	?
83	1837	Denmark (Mansa)	1/160,000	1 = 0·396	1 = 0·465	18	Finished.
84	1803	Prussia, Ancient	1/150,000	1 = 0·422	1 = 0·486	25	Finished.
85	1849	Austria, Bohemia	1/144,000	1 = 0·440	1 = 0·506	39	26
86	?	,, Moravia and Silesia ..	1/144,000	1 = 0·440	1 = 0·506	20	Finished.
87	1810	,, Salzburg	1/144,000	1 = 0·440	1 = 0·506	15	Finished.
88	1813	,, Proper	1/144,000	1 = 0·440	1 = 0·506	31	Finished.
89	1825	,, Tyrol	1/144,000	1 = 0·440	1 = 0·506	24	Finished.
90		Styria and Illyria	1/144,000	1 = 0·440	1 = 0·506	36	
91	1855	Spain, Province of Oviedo (Schulz)	1/127,500	1 = 0·497	1 = 0·570	3	Finished.
92	1856	Malta and Gozo (Ordnance) ..	1/126,720	1 = 0·500	1 = 0·574	2	Finished.
93	?	Russia and Poland, &c.	1/126,000	1 = 0·503	1 = 0·576	900	437
94	1857	Switzerland (Zürich)	1/125,000	1 = 0·508	1 = 0·582	1	Finished.
95	1853	Switzerland, St. Gall	1/125,000	1 = 0·508	1 = 0·582	1	Finished.
96		Denmark	1/120,000	1 = 0·528	1 = 0·607	18	Finished.
97	1854	Slesvig and Als	1/120,000	1 = 0·528	1 = 0·607	6	2
98	1829	Saxony (Finance Survey)	1/118,750	1 = 0·534	1 = 0·614	28	Finished.
99	1829	Holland (Krayenhoff)	1/115,200	1 = 0·550	1 = 0·640	9	?
100	1855	Austria, Galicia	1/115,200	1 = 0·550	1 = 0·640	60	30
101	1808	Naples (Zannoni)	1/114,348	1 = 0·554	1 = 0·635	31	?

TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
102	1774	Tyrol (Anich and Huber)	1/102,486	1=0·615	1=0·696	20	?
103	?	Finland	1/100,000	1=0·628	1=0·729	?	?
104	1810	Bavaria	1/100,000	1=0·633	1=0·729	128	Finished.
105	1856	Brunswick (Strombeck)	1/100,000	1=0·633	1=0·729	4	Finished.
106	1852	Hanover (Roemer)	1/100,000	1=0·633	1=0·729	?	8
107	,,	,, and Brunswick (Papen)	1/100,000	1=0·633	1=0·729	65	Finished.
108	,,	Hohenzollern, Duchies of (Liebenow)	1/100,000	1=0·633	1=0·729	?	?
109	?	Prussia, East	1/100,000	1=0·633	1=0·729	320	164
110	?	Sweden, Villages	1/100,000	1=0·633	1=0·729	?	?
111	1834	Switzerland (Dufour)	1/100,000	1=0·633	1=0·729	25	19
112	?	Prussia, Pomerania	1/100,000	1=0·633	1=0·729	56	
113	1852	Belgium (Vander Maelen)	1/100,000	1=0·633	1=0·729	9	5
114	?	Brandenburg, Province (Staff) ..	1/100,000	1=0·633	1=0·729	44	Finished.
115	1851	Freiburg, Canton of (Stryienski)	1/100,000	1=0·633	1=0·729	1	Finished.
116	?	Prussia, Posen	1/100,000	1=0·633	1=0·729	41	Finished.
117	?	Portugal	1/100,000	1=0·633	1=0·729	36	2
118	?	Sweden (Topo. Corps)	1/100,000	1=0·633	1=0·729	?	?
119	1856	Denmark (Bull)	1/96,000	1=0·660	1=0·760	23	?
120	?	Switzerland, Neuchatel (Osterwald)	1/96,000	1=0·660	1=0·760	1	Finished.
121	1843	Lübeck	1/91,700	1=0·691	1=0·795	1	Finished.
122	?	Venetian Lombardy	1/86,400	1=0·738	1=0·844	42	Finished.
123	1783	France (Cassini)	86,400	1=0·738	1=0·844	184	Finished.
124	1842	Modena (Austrian Staff)	1/86,400	1=0·738	1=0·844	8	Finished.
125	1828	Parma (Austrian Staff)	1/86,400	1=0·738	1=0·844	9	Finished.
126	1851	Tuscany and Papal States (Austr. St.)	1/86,400	1=0·738	1=0·844	52	Finished.
127	?	Austria, Upper	1/86,400	1=0·738	1=0·844	12	Finished.
128	1848	Russia, Government of Tver ..	1/84,000	1=0·754	1=0·868	159	
129	1854	Belgium (Gerard)	1/80,000	1=0·790	1=0·912	25	
130	1853	Slesvig	1/80,000	1=0·790	1=0·912	81	8
131	1833	France	1/80,000	1=0·790	1=0·912	258	190
132	1815	Naples and Sicily	1/80,000	1=0·790	1=0·912	68	8
133	1832	Prussia, Rhenish, (Schropp, &c.)	1/80,000	1=0·790	1=0·912	72	Finished.
134	1857	Roman States (Dépôt de la Guerre)	1/80,000	1=0·790	1=0·912	4	Finished.
135	1840	Belgium (Vander Maelen)	1/80,000	1=0·790	1=0·912	25	Finished.
136	?	Thurgau, Canton of (Sulzberger)	1/80,000	1=0·790	1=0·912	1	Finished.

TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
137	?	Westphalia	1/80,000	1 = 0·790	1 = 0·912	72	Finished.
138	1849	Limburg, Duchy of	1/75,000	1 = 0·846	1 = 0·972	4	Finished.
139	1801	England and Wales	1/63,360	1 = 1·000	1 = 1·151	110	90
140	?	Spain (Itineraries)	1/60,000	1 = 1·056	1 = 1·224	?	?
141	1832	Soleure, Canton (Walker)	1/60,000	1 = 1·056	1 = 1·224	1	Finished.
142	1837	Saxony	1/57,600	1 = 1·100	1 = 1·267	20	14
143	?	Algeria	1/50,000	1 = 1·267	1 = 1·459	?	?
144	1838	Baden	1/50,000	1 = 1·267	1 = 1·459	56	Finished.
145	1812	Bavaria	1/50,000	1 = 1·267	1 = 1·459	112	92
146	1840	Hesse Cassel	1/50,000	1 = 1·267	1 = 1·459	84	?
147	1833	,, Darmstadt	1/50,000	1 = 1·267	1 = 1·459	27	?
148	1832	,, Duchy	1/50,000	1 = 1·267	1 = 1·459	31	Finished.
149	1840	,, Principality of	1/50,000	1 = 1·267	1 = 1·459	44	33
150	1850	Holland	1/50,000	1 = 1·267	1 = 1·459	62	17
151	1788	Mecklenburg Schwerin	1/50,000	1 = 1·267	1 = 1·459	16	Finished.
152	1856	Oldenburg	1/50,000	1 = 1·267	1 = 1·459	16	2
153	1850	Sardinia (Cassiage)	1/50,000	1 = 1·267	1 = 1·459	91	51
154	1829	Würtemberg	1/50,000	1 = 1·267	1 = 1·459	55	Finished.
155	?	Neuchatel, Canton of	1/50,000	1 = 1·267	1 = 1·459	?	
156	1834	Algeria	1/50,000	1 = 1·267	1 = 1·459	2	Finished.
157	?	Berne, Canton	1/50,000	1 = 1·267	1 = 1·459	2	
158	?	Vaud, Canton of	1/50,000	1 = 1·267	1 = 1·459	?	
159	1848	Aargau, Canton (Michaelis)	1/50,000	1 = 1·267	1 = 1·459	4	Finished.
160	1855	Freiburg, Canton (Stryienski)	1/50,000	1 = 1·267	1 = 1·459	4	Finished.
161	1857	Vienna, &c.	1/43,200	1 = 1·467	1 = 1·692	4	Finished.
162	1835	Crimea	1/42,000	1 = 1·508	1 = 1·735	89	Finished.
163	1848	Plan of Moscow	1/42,000	1 = 1·508	1 = 1·735	6	Finished.
164	1820	,, of Vilna	1/42,000	1 = 1·508	1 = 1·735	1	Finished.
165	?	Denmark, Towns	1/40,000	1 = 1·584	1 = 1·846	?	?
166	1780	Mecklenburg Strelitz	1/38,900	1 = 1·869	1 = 2·153	9	Finished.
167	?	Frankfort	1/25,000	1 = 2·534	1 = 2·915	1	Finished.
168	1857	Luxemburg	1/25,000	1 = 2·534	1 = 2·915	4	Finished.
169	?	Sardinia, Towns	1/25,000	1 = 2·534	1 = 2·915	6	Finished.
170	1851	Zürich, Canton of	1/25,000	1 = 2·534	1 = 2·915	25	15
171	1854	Switzerland (St. Gallen and Appenzell, Cantons of)	1/25,000	1 = 2·534	1 = 2·915	16	?

TABLE II.—PRINCIPAL MAPS OF EUROPEAN STATES, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
172	?	Switzerland (St. Gall, Canton of)	1/25,000	1 = 2·534	1 = 2·915	16	Finished.
173	1846	Switzerland (Zug)	1/25,000	1 = 2·534	1 = 2·915	1	Finished.
174	?	Geneva, Canton of (Dufour) ..	1/25,000	1 = 2·534	1 = 2·915	4	Finished.
175	1819	Naples, Environs of (Staff Survey)	1/25,000	1 = 2·534	1 = 2·915	8	Finished.
176	?	Rome (Dépôt de la Guerre)	1/20,000	1 = 3·168	1 = 3·648	?	Finished.
177	1854	Belgium (Vander Maelen)	1/20,000	1 = 3·168	1 = 3·648	250	Finished.
178	1853	Sweden, Towns (Lyungren)	1/20,000	1 = 3·168	1 = 3·648	?	46
179	1834	Ireland (Ordnance Survey) ..	1/10,560	1 = 6·000	1 = 6·910	1907	Finished.
180	1846	Scotland (ditto)	1/10,560	1 = 6·000	1 = 6·910	?	249
181	?	Bavaria	1/10,000	1 = 6·326	1 = 7·296	97	Finished.
182	1830	Holland, Rivers	1/10,000	1 = 6·326	1 = 7·296	101	70
183	?	St. Petersburg, Plan of	1/8,400	1 = 7·543	1 = 8·692	9	Finished.
184	1845	Russia, Towns	1/8,400	1 = 7·543	1 = 8·692	?	?
185	?	Prussia, Towns	1/6,250	1 = 10·137	1 = 11·610	?	?
186	1828	St. Petersburg (Schubert)	1/4,200	1 = 15·186	1 = 17·384	24	Finished.
187	?	Bavaria, Towns	1/2,500	1 = 25·334	1 = 29·18	?	?
188	1840	Belgium, Towns	1/2,500	1 = 25·334	1 = 29·18	34	?
189	?	Würtemberg, Towns	1/2,500	1 = 25·334	1 = 29·18	?	?

TABLE III.—BRITISH MAPS, &c.

No.	Year.	Name of the Country.	Scale. A. Natural	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance
				miles. inches.	miles. inches.		
190	1801	England and Wales—General ..	1/63,360	1 = 1·000	1 = 1·151	110	92
191	1846	,, 6 Counties ..	1/10,560	1 = 6·000	1 = 6·910	726?	422
192		,, London ..	1/10,560	1 = 6·000	1 = 6·910	26?	Finished.
193	1850	,, London ..	1/5,280	1 = 12·000	1 = 13·818	44	Finished.
194	1850	,, London ..	1/1,056	1 = 60·000		831	
195	1855	,, 32 Parishes ...	1/2,500	1 = 25·334	1 = 29·180		805
196	1848	,, 71 Towns ..	1/1,056	1 = 60·000			1137
197	1852	,, Plymouth ..	1/500	1 = 126·72			19

TABLE III.—BRITISH MAPS, &c.—*continued.*

No.	Year.	Name of the Country.	Scale. A. Natural.	Scale. B. Statute Mile.	Scale. C. Geog. Mile.	Sheets when Complete.	State of Advance.
				miles. inches.	miles. inches.		
198		Scotland—General	$\frac{1}{63,360}$	1 = 1·000	1 = 1·151	121	Finished.
199		,, 18 Counties	$\frac{1}{10,560}$	1 = 6·000	1 = 6·910	651	267
200		,, 68 Parishes	$\frac{1}{2,500}$	1 = 25·334	1 = 29·180	1379	Finished.
201		,, 13 Towns	$\frac{1}{1,056}$	1 = 60·000		116	Finished.
202	1857	Ireland—General	$\frac{1}{63,360}$	1 = 1·000	1 = 1·151	59	?
203	1834	,, 33 Counties	$\frac{1}{10,560}$	1 = 6·000	1 = 6·910	1097	Finished.
204	1847	,, Towns (Dublin)	$\frac{1}{1,056}$	1 = 60·000		33	Finished.
205		Malta and Gozo	$\frac{1}{126,720}$	1 = 0·500	1 = 0·574	2	Finished.
205*	1845	Hong Kong (Collinson, R. E.) ..	$\frac{1}{15,840}$	1 = 4·000	1 = 4·604	4	Finished.
206	1827	India (Staff)	$\frac{1}{253,640}$	1 = 0·245	1 = 0·282	117	58
207		Ceylon Island (Fraser)	$\frac{1}{253,440}$	1 = 0·250	1 = 0·288	8	?
207*		,, Kandian Districts (do.) .. (Arrowsmith)	$\frac{1}{63,360}$	1 = 1·000	1 = 1·151	4	Finished.
208	1847	England and Wales (Johnston) ..	$\frac{1}{379,400}$	1 = 0·167	1 = 0·200	4	Finished.
209	1855	,, (Creighton)	$\frac{1}{316,800}$	1 = 0·200	1 = 0·230	9	Finished.
210	1815	,, (Arrowsmith)	$\frac{1}{189,700}$	1 = 0·334	1 = 0·390	18	Finished.
211	1858	Scotland (Johnston)	$\frac{1}{633,600}$	1 = 0·100	1 = 0·118	1	Finished.
212	1855	,, (Carrington)	$\frac{1}{316,800}$	1 = 0·200	1 = 0·230	6	Finished.
213	1838	Ireland (Walker)	$\frac{1}{357,960}$	1 = 0·177	1 = 0·206	2	Finished.
214	1838	,, (Larcom)	$\frac{1}{253,440}$	1 = 0·250	1 = 0·290	6	Finished.

The Ordnance Survey of the British Isles being projected on the statute mile of 5280 feet, the column B. affords a ready means of comparing the Ordnance Survey with any foreign Government map. Comparing the Government Survey of Belgium with the Ordnance Survey of Ireland, place the scales one above the other, with the names against each, thus:—

$$\begin{array}{ll} \text{Belgium} \ldots\ldots\ldots\ldots & 3\cdot168 \\ \text{Ireland} \ldots\ldots\ldots\ldots & 6\cdot000 \end{array} = \tfrac{1}{2} \text{ nearly,}$$

shows at once that the Belgian Survey is on one-half the scale of the Irish Survey.

$$\begin{array}{ll} \text{Russia (Tver)} \ldots\ldots\ldots\ldots & 0\cdot754 \\ \text{Scotland} \ldots\ldots\ldots\ldots & 6\cdot000 \end{array} = \tfrac{1}{8}:$$

The Russian Survey is, therefore, $\frac{1}{8}$ the size of that of Scotland.

All the foreign maps are projected on the scale C.

Column A. of the Scales will be found very useful in obtaining the proportion of the inch to a mile from Maps or Charts on which the Natural Scale only is given. Enter the column A., and find the nearest number to the given Natural Scale, and on the same line towards the right will be seen the proportion it bears to the statute and geographical mile.

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